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GROUND RADAR SYSTEMS



CAREER FIELD EDUCATION AND TRAINING PLAN

**GROUND RADAR SYSTEMS
AFSC 2E0X1
CAREER FIELD EDUCATION AND TRAINING PLAN**

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PART I

Preface

1. Resource constraints in the Air Force are impacting the availability of our most valuable resource-- people. This condition, which will continue to exist in the future, makes it essential for the work force to be effectively and efficiently trained to perform duties within each skill level of an Air Force Specialty (AFS). To meet the challenges of tomorrow the Air Force must place a greater emphasis on career field training. This Career Field Education and Training Plan (CFETP) is a management tool that enables the Air Force and each MAJCOM to place the needed emphasis on total career field training. It provides the framework and guidance necessary to plan and develop a career field training program. The plan, which is a "training road map" for the career field, identifies mandatory and optional training requirements. It includes initial skills, upgrade, and continuation training that individuals should receive during their career in this specialty.

2. The CFETP, which documents the career field training program, consists of two parts. Management uses both parts to plan, manage, and control training within the career field.

2.1. Part I, Section A, provides the information necessary for overall management of training in the career field. It contains administrative details and explains the purpose and use of the CFETP. Section B provides a description of the specialty, suggests career field progression, provides career field information, documents training decisions, defines each skill level, and identifies MAJCOM continuation training options. Section C specifies qualification requirements for upgrade/progression in each subsequent skill level in the career field. It also identifies sources of training other than those provided by the Air Education and Training Command (AETC). Section D identifies known resource constraints.

2.2. Part II of the CFETP contains the Specialty Training Standard (STS) and identifies the various training sources and courses available to members of the specialty. The STS is comprised of the Course Training Standard (CTS) and the Career Training Guide (CTG). The CTS includes the tasks and knowledge requirements for award of the three skill level. The CTG includes task and knowledge requirements for upgrade/progression to subsequent skill levels in the career field and identifies career development course (CDC) subject content. Supervisors and trainers at the unit level use Part I, Section C, and Part II of the CFETP to identify, plan, and conduct unit level training commensurate with the overall goals of this plan.

3. Use of the guidance provided in this CFETP ensures individuals in this career field receive effective and efficient training at the appropriate points in their careers. This plan enables the Air Force to train today's work force for tomorrow's jobs.

Abbreviations/Terms Explained

This section provides a common understanding of the terms that apply to the Ground Radar Systems Career Field and Education Training Plan.

Advanced Training. A formal course of training that leads to a technical or supervisory level of an AFS. Training is for selected airmen at the advanced level of an AFS.

Air Education Training Command (AETC).

Air Force Career Field Manager (AFCFM). Representative appointed by the respective HQ USAF Deputy Chief of Staff or Under Secretariat to ensure that assigned AF specialties are trained and utilized to support AF mission requirements.

Air Force Institute for Advanced Distributed Learning (AFIADL). The result of a merger between the Air Force Distance Learning Office and the Extension Course Institute (ECI).

Air Force Job Qualification Standard (AFJQS). A comprehensive task list that describes a particular job type or duty position. Supervisors use the AFJQS to document task qualification. The tasks on AFJQSs are common to all persons serving in the described duty position.

Air Force Qualification Training Package (AFQTP). An instructional course designed for use at the unit to qualify or aid qualification in a duty position, program, or on a piece of equipment. It may be printed, computer-based, or other audiovisual media.

Air Force Specialty (AFS). A group of positions (with the same title and code) that require common qualifications.

Career Field Education and Training Plan (CFETP). A comprehensive, multipurpose document, that encapsulates the entire spectrum of career field training. It outlines a logical growth plan that includes training resources and is designed to make career field training identifiable, eliminate duplication, and is budget defensible. CFETPs are officially posted [at http://afpubs.hq.af.mil/](http://afpubs.hq.af.mil/). You can also download them from <http://www.il.hq.af.mil/ilm/ilmm/cemaint/index.html> or <https://wwwmil.keesler.af.mil/81trss/qflight/welcome.html>.

Career Training Guide (CTG). A document that uses Task Modules (TM) in lieu of tasks to define performance and training requirements for a career field.

Certifying Official. A person assigned by the commander to determine an individual's ability to perform a task to the required standard.

Computer Based Training (CBT). A forum for training in which the student learns via a computer terminal. It is an especially effective training tool that allows the students to practice applications while they learn.

Continuation Training. Additional advanced training that exceeds the minimum upgrade training requirements and emphasizes present or future duty assignments.

Core Task. A task Air Force Career Field Managers (AFCFM) identify as a minimum qualification requirement within an AFSC or duty position.

Course Training Standard (CTS). A standard developed for all courses not governed by an STS, including specialized training packages and computer-based training courses.

Enlisted Specialty Training (EST). A mix of formal training (technical school) and informal training (on-the-job) to qualify and upgrade airmen in each skill level of a specialty.

Exportable Training. Additional training via computer assisted, paper text, interactive video, or other necessary means to supplement training.

Go/No Go. In OJT, it is the stage at which an individual has gained enough skill, knowledge, and experience to perform a task without supervision.

Initial Skills Training. A formal resident course resulting in award of the 3-skill level.

Instructional System Development (ISD). A deliberate and orderly (but flexible) process for planning, developing, implementing, and managing instructional systems. It ensures personnel are taught in a cost efficient way the knowledge, skills, and attitudes essential for successful job performance.

Major Command (MAJCOM).

Occupational Survey Report (OSR). A detailed report showing the results of an occupational survey of tasks performed within a particular AFSC.

On-the-Job Training (OJT). Hands-on, over-the-shoulder training conducted to certify personnel in both upgrade (skill level award) and job qualification (duty position certification) training.

Qualification Training. Actual hands-on, task performance based training designed to qualify airmen in a specific duty position. This training program occurs both during and after the upgrade training process and is designed to provide skills training required to do the job.

Resource Constraints. Resource deficiencies (such as money, facilities, time, manpower, and equipment) that preclude desired training from being delivered.

Skill Training. A formal course that results in the award of a skill level.

Specialty Training Package and COMSEC Qualification Training Package. A composite of lesson plans, test material, instructions, policy, doctrine, and procedures necessary to conduct training. These packages are prepared by AETC, approved by National Security Agency (NSA), and administered by qualified communications security (COMSEC) maintenance personnel.

Specialty Training Standard (STS). An Air Force publication that describes skills and knowledge that an airman in a particular AFSC needs on the job. It further serves as a contract between AETC and the user to show the overall training requirements for an AFSC that the formal schools teach.

Standard. An exact value, a physical entity, or an abstract concept established and defined by authority, custom, or common consent to serve as a reference, model, or rule in measuring quantities or qualities, establishing practices or procedures, or evaluating results. It is a fixed quantity or quality.

Task Module (TM). A group of tasks performed together within an AFSC that require common knowledge, skills, and abilities. TMs are identified by an identification code and a statement.

Total Force. All collective components (active, reserve, guard, and civilian elements) of the United States Air Force.

Training Capability. The capability of a training setting to provide training on specified requirements, based on the availability of resources.

Training Planning Team (TPT). Comprised of the same personnel as a U&TW, TPTs are more intimately involved in training development and the range of issues examined is greater than in the U&TW forum.

Training Requirements Analysis (TRA). A detailed analysis of tasks for a particular AFSC to be included in the training decision process.

Training Setting. The type of forum in which training is provided (formal resident school, on-the-job, field training, mobile training team, self-study, etc.).

Upgrade Training. Training that leads to the award of a higher skill level.

Utilization and Training Pattern. A depiction of the training provided to and the jobs performed by personnel throughout their tenure within a career field or AFS. There are two types of patterns: 1) Current pattern, which is based on the training provided to incumbents and the jobs to which they have been and are assigned; and 2) Alternate pattern, which considers proposed changes in manpower, personnel, and training policies.

Utilization and Training Workshop (U&TW). A forum of the AFCFM, MAJCOM functional managers, subject matter experts (SME), and AETC training personnel that determines career ladder training requirements.

Section A - General Information

1. Purpose of the CFETP. This CFETP provides the information necessary for career field managers, training management, supervisors, and trainers to plan, develop, manage, and conduct an effective and efficient career field training program. The plan outlines the training that individuals should receive in order to develop and progress throughout their careers. For purposes of this plan, training is divided into three areas: initial skills, upgrade, and continuation training. Initial skills training is the AFS specific training an individual receives upon entry in the Air Force, normally conducted by AETC at one of the technical training centers. Upgrade training identifies the mandatory courses, task qualification requirements, and Career Development Course (CDC) completion required for award of the 5-, 7-, or 9-skill level. Continuation training is additional training provided to 3-, 5-, 7-, and 9-level personnel to increase their skills and knowledge beyond the minimum required for upgrade. The CFETP has several purposes, some of which are:

- 1.1. Serves as a management tool to plan, develop, manage, and conduct a career field training program. Also, ensures that established training is provided at the appropriate point in an individual's career.
- 1.2. Identifies task and knowledge training requirements for each skill level in the specialty and recommends training throughout each phase of an individual's career.
- 1.3. Lists training courses available in the specialty, identifies sources of the training, and provides the training medium.
- 1.4. Identifies major resource constraints that impact implementation of the desired career field training program.

2. Use of the CFETP. The CFETP is maintained by the Air Force Career Field Manager (AFCFM). MAJCOM Functional Managers and AETC review the plan annually to ensure currency and accuracy and forward recommended changes to the AFCFM. Using the list of courses in Part II, they determine whether duplicate training exists and take steps to eliminate/prevent duplicate efforts. Career field training managers at all levels use the plan to ensure a comprehensive and cohesive training program is available for each individual in the career ladder.

- 2.1. AETC training personnel develop/revise formal resident and exportable training based upon requirements established by the users and documented in the STS. They also develop procurement and acquisition strategies for obtaining resources needed to provide the identified training.
- 2.2. MAJCOM Functional Managers ensure their training programs complement the CFETP mandatory initial skill and upgrade requirements. They also identify the needed AFJQSS/AFQTPs to document unique upgrade and continuation training requirements. Requirements are satisfied through OJT, resident training, or exportable courseware/courses. MAJCOM developed training to support this AFSC must be identified for inclusion into this plan. Forward recommendations concerning this CFETP to your MAJCOM Functional Manager.
- 2.3. 81 TRSS Qualification Training Flight (Q-Flight) personnel develop AFJQSS/AFQTPs based on requests submitted by the MAJCOMs and according to the priorities assigned by the Communications-Electronics (C-E) Maintenance Training Advisory Group (MATAG) Working Group.
- 2.4. Unit level training managers and supervisors manage and control progression through the career field by ensuring individuals complete the mandatory training requirements for upgrade specified in this plan and supplemented by their MAJCOM. The list of courses in Part II is used as a reference for planning continuation or career enhancement training.

3. Coordination and Approval of the CFETP. The AFCFM is the approval authority. MAJCOM representatives and AETC training personnel coordinate on the career field training requirements. The AFCA Mission Area Manager (MAM) reviews CFETPs for accuracy prior to submission for approval by the AFCFM.

Section B - Career Field Progression and Information

4. Specialty Description. This information supplements that presented in AFMAN 36-2108.

4.1. Ground Radar Systems Apprentice/Journeyman.

4.1.1. Specialty Summary. Installs, maintains, modifies, and repairs fixed or transportable air traffic control radar, weather radar, and aircraft control and warning radar. Included is display equipment, related operator training devices, associated communications subsystems, radar beacon systems, remoting systems, video mappers, computerized processing devices, and associated equipment, including test equipment. Deploys, sets up, and relocates ground radar systems. Places radar systems in operation and completes commissioning flight checks.

4.1.2. Duties and Responsibilities:

4.1.2.1. Maintains ground radar systems, associated communications equipment, radar beacon systems, remoting devices, video mappers, and display equipment. Inspects ground radar systems to locate defective items such as solid state components, integrated circuits, faulty vacuum tubes and associated circuitry, and any associated hardware such as bearings, slip rings, and mechanical fittings. Evaluates equipment performance. Isolates malfunctions by prescribed system checking procedures and visual inspections, waveform observations, voltage checks, and other tests, using electronic test equipment. Repairs radar components including antennas, transmitters, receivers, and related equipment, using hand tools, soldering irons, desoldering tools, and test instruments. Repairs systems according to technical orders, manufacturers handbooks, and local procedures. Performs maintenance inspections on antennas, and wire components in radar systems. Adjusts or replaces defective components. Maintains radar cable systems. Installs and maintains support structures. Locates and repairs leaks in pressurized RF transmission systems. Accomplishes equipment modifications according to time compliance technical orders, or field directives. Performs corrosion control.

4.1.2.2. Installs ground radar systems and associated equipment. Checks equipment using tools and test equipment. Assembles, connects, modifies, and adjusts ground radar components such as antennas, transmitters, receivers, indicator groups, beacon equipment, video mappers and processors, and power supplies. Conducts tests of installed equipment for proper component assembly and compliance with technical orders. Places equipment in operation, tunes, and aligns components to comply with technical order specifications. Assists in performing organizational maintenance of ancillary radio and wire components of radar systems.

4.1.2.3. Relocates ground radar systems. Inspects equipment for serviceability before and after relocation. Disassembles, assembles, and connects equipment. Conducts equipment tests for proper assembly and compliance with technical orders. Places equipment in operation, and tunes, adjusts, and aligns systems.

4.1.2.4. Maintains Command, Control, Communications, and Computer (C4) Systems Installation Records (CSIR), and maintenance and inspection records. Posts entries on CSIRs, maintenance, and inspection records. Records meter readings and other data in equipment performance logs. Submits maintenance data information. Records data on equipment historical forms. Recommends methods to improve equipment performance and maintenance procedures. Processes civil engineering work clearance requests. Operates and maintains tools, test equipment, auxiliary equipment, and vehicles.

4.2. Ground Radar Systems Craftsman.

4.2.1. Specialty Summary. Includes all information in paragraph 4.1.1. Plans and schedules installation and maintenance of Ground Radar Systems.

4.2.2. Duties and Responsibilities.

4.2.2.1. Includes all duties and responsibilities of paragraph 4.1.2.

4.2.2.2. Supervises Ground Radar Maintenance Activities. Establishes requirements for tools, equipment, and technical documents. Establishes work standards, methods, and controls for functions such as periodic inspections, operational testing, and component repair. Reviews, evaluates, and resolves documented deficiencies. Ensures maintenance data collection forms and inspection and maintenance records are completed correctly and accurately. Evaluates justification and practicality of recommended improvements to equipment performance and maintenance procedures. Develops safety standards and practices for ground radar maintenance activities. Coordinates with appropriate agencies to ensure systems support requirements.

4.2.2.3. Resolves problems encountered during siting, installation, repair, overhaul, and modification of ground radar systems. Uses layout drawings, schematics, and pictorial diagrams to solve maintenance problems, and analyzes construction, employment, and operating characteristics of equipment to determine source of malfunction. Performs intricate alignment and calibration procedures. Determines repair procedures necessary to correct defective equipment. Interprets and implements maintenance and installation policy and procedures. Identifies maintenance problem areas, and recommends corrective action. Develops methods to improve maintenance efficiency.

4.2.2.4. Inspects ground radar systems and associated support and peripheral equipment and systems to determine operational status. Interprets inspection findings, and determines adequacy of corrective actions. Checks new and repaired components for technical order compliance prior to installation.

4.2.2.5. Plans, schedules, coordinates, and implements installation, repair, modification, or overhaul of ground radar systems and associated support and peripheral equipment and systems.

4.3. Communications Systems Superintendent.

4.3.1. Specialty Summary. Manages and directs communications systems maintenance facilities and resources. Included are functions of installing, maintaining, repairing, overhauling, deploying, and modifying. Systems and equipment include ground radio equipment; navigation and meteorological systems; satellite and microwave communications systems; video, television studio, and intrusion detection systems; combat camera space systems, telemetry and instrumentation missions, and imagery systems.

4.3.2. Duties and Responsibilities. This specialty "caps" at the Senior Master Sergeant level with those personnel that came up through the 2E0XX and 2E1XX career fields. Therefore, the duties and responsibilities defined below encompass the complete spectrum of this specialty.

4.3.2.1. Plans and organizes maintenance activities. Prepares and analyzes reports encompassing siting, deploying, maintaining, installing, repairing, and removing communications systems, combat camera equipment, imagery systems, and related equipment. Included are ground radio equipment; navigation and meteorological systems; satellite and microwave communications systems; video, television studio, and intrusion detection systems; combat camera space systems, telemetry and instrumentation missions, and imagery systems. Coordinates activities and resolves common problems.

4.3.2.2. Directs maintenance activities. Checks systems and equipment for proper siting, installation, and serviceability. Directs personnel employed in siting, deploying, inspecting, adjusting, removing, replacing, and repairing communication systems and related equipment. Directs overhaul and repair of ground radio equipment; navigation and meteorological systems; satellite and microwave communications systems; video, television studio, and intrusion detection systems; combat camera space systems, telemetry and instrumentation missions, and imagery systems. Ensures work standards are maintained. Determines extent and economy of repair, including disposition of malfunctioning equipment.

4.3.2.3. Inspects and evaluates maintenance actions. Interprets findings and recommends or initiates corrective action. Serves on or directs inspection teams to evaluate maintenance activities. Discusses inspection findings. Maintains liaison with users to ensure adequate services are being provided.

4.3.2.4. Supervises maintenance functions. Resolves problems with installing, maintaining, repairing, and overhauling systems and equipment. Establishes local maintenance procedures and policies. Performs research and development of new systems and equipment.

4.4. Communications-Electronics Chief Enlisted Manager. This specialty “caps” at the Chief Master Sergeant Level with those specialties that came up through the 2E0XX, 2E1XX, 2E2XX, 2E3XX, and 2E6XX career ladders. Personnel attaining the rank of Chief are assigned broad ranging duties in directing and managing diverse functions such as activities that install, remove, relocate, repair, and maintain radar systems, telephone systems, satellite, wideband and telemetry systems, ground radio systems, meteorological and navigation systems, visual, imagery and intrusion detection systems, computer, network, switching and cryptographic, and antenna and cable systems. Other challenges that these Chiefs face are assignments to the White House Communications Agency, Air Force Element at CENTCOM, the Air Force Communications Agency, Defense Information Systems Agency, NATO, etc.

4.5. The following are some of the more common missions you may encounter as a 2E0X1.

[AN/WSR-88D NEXT GENERATION WEATHER RADAR \(NEXRAD\)](#)



[AN/TPN-22 PRECISION APPROACH RADAR](#)



AN/GPN-20 AIRPORT SURVEILLANCE RADAR



[AN/TPS-75 MOBILE RADAR](#)



[AN/TPN-19 LANDING CONTROL CENTER](#)



5. Skill/Career Progression. Adequate training and timely progression from the apprentice to superintendent skill levels play an important role in the Air Force's ability to accomplish its mission. It is essential that everyone involved in training do their part to plan, manage, and conduct an effective training program. The guidance provided in this part of the CFETP and the 2E0X1 Education and Training Path table will ensure individuals receive viable training at appropriate points in their careers.

Apprentice (3-Level) Training
Upon completion of initial skills training a trainee will work with a trainer to enhance their knowledge and skills.
Utilize CDCs, AFJQSs/AFQTPs, and other exportable courses to progress in the field.
Once task certified, a trainee may perform the task unsupervised.
Journeyman (5-Level) Training
Enter into continuation training to broaden experience base.
Five-levels may be assigned job positions such as team leader and shift supervisor.
Attend the Airman Leadership School (ALS) after serving 48 months in the Air Force or selection to rank of SSgt (active duty only). In-residence or correspondence course is required for Air National Guard/Air Force Reserve Command (ANG/AFRC) personnel.
Use CDCs and other references identified by the AFCFM to prepare for Weighted Airman Performance Systems (WAPS) testing.
Should continue pursuing a Community College of the Air Force (CCAF) degree.
Craftsman (7-Level) Training
A seven-level can expect to fill various supervisory and management positions such as shift leader, team chief, supervisor, or task certifier.
Seven-levels should take courses or obtain added knowledge on management of resources and personnel and attend the 7-level resident course.
Encouraged continuing academic education through CCAF and higher degree programs.
Attend the Noncommissioned Officer Academy (NCOA). In-residence or correspondence course is required for ANG/AFRC personnel.
Superintendent (9-Level) Training
A nine-level can be expected to fill positions such as flight chief, superintendents, and various staff positions.
Should pursue increased knowledge for budget, manpower, resources, and personnel management.
Recommend they pursue additional education and completion of courses outside of their AFS.
Attend the Senior Noncommissioned Officer Academy (SNCOA).
Chief Enlisted Manager (CEM) Training
Must be selected for CMSgt and possess qualifications in a feeder specialty (2E190, 2E291, and 2E690).
CEMs work in a variety of similar jobs and functional areas where general managerial and supervisory abilities can be most effectively used and challenged.
Resident graduation of the USAF Senior NCO Academy (SNCOA) is a prerequisite for CMSgt sew-on (active duty only). In-residence or correspondence course required for ANG/AFRC personnel.

6. Training Decisions. This CFETP was developed to encapsulate an entire spectrum of training requirements for the Ground Radar Systems career field, using a building block approach (simple to complex). Included in this spectrum was the strategy of when, where, and how to meet the training requirements. The strategy must be apparent and affordable to reduce duplication of training and eliminate a disjointed approach to training. The following decisions were made by members of the 30 January -1 February 2001 Utilization and Training Workshop.

6.1. Initial Skills. Additional training was added to the basic course after it was determined that the initial electronic principles course was not enough to support the radar career field. Also, training was added or increased in the following areas: weather radar missions, TPS-75 hands-on training, weather radar systems, and future technologies.

6.2. Five-Level Upgrade Requirements. Upgrade requirements were updated to include eight standardized areas common to all career fields. The following list identifies the major areas covered: test equipment, standardized maintenance practices, computer security, standard installation practices, communication principles, expeditionary communications principles, information transport concepts, and electrical power systems. Additionally, a review of CDCs resulted in future development being restricted to six volumes. Development of this single set of CDCs will include three volumes which will be used by all 2EXXX career fields. The following table outlines 5-level CDC contents.

VOLUME 1	Electronic Principles (Computer Based Training)
VOLUME 2	Test Equipment
VOLUME 3	Communication Principles
VOLUME 4	AFSC Specific Information
VOLUME 5	AFSC Specific Information
VOLUME 6	AFSC Specific Information

6.3. Seven-Level Upgrade Requirements. The requirement for 7-level CDCs was deleted. A significant part of the information previously covered in the CDCs is being converted into an AFQTP or made into a 5-level upgrade training requirement. New 7-level training requirements were added which provide a common core of proficiency among all individuals in the 2EXXX arena. Training covers deployment concepts, system planning and implementation, and management principles.

6.4. Proficiency Training. This training is job qualification for an assigned duty position. Additional qualification training becomes necessary when personnel transfer to another duty position, the unit mission changes, a new personnel program comes on board, or any time changes in techniques or procedures occur.

6.5. Continuation Training: The purpose of the continuation training program is to provide additional advanced training, exceeding the minimum upgrade training requirements, with the emphasis on present and future duty positions. MAJCOMs may develop a continuation training program to ensure individuals in the career field receive the necessary training at the appropriate points in their careers. The training program will identify both mandatory and optional training requirements.

7. Community College of the Air Force (CCAF) Academic Programs. Enrollment in CCAF occurs upon completion of basic military training. CCAF provides the opportunity for all enlisted members to obtain an Associate in Applied Science degree. The degree must be completed before the student separates from the Air Force, retires, or is commissioned as an officer. In addition to its associates degree program, CCAF offers the following:

7.1. Occupational Instructor Certification. The College offers the Occupational Instructor Certification to instructors teaching full time in a CCAF affiliated school. To qualify, instructors must complete an instructor course, a teaching practicum, have two years teaching experience, hold an associate or higher degree, and be recommended by their commander/commandant.

7.2. Trade Skill Certification. When a CCAF student separates or retires, a trade skill certification is awarded for the primary occupational specialty. The College uses a competency based assessment process for trade skill certification at one of four proficiency levels-Apprentice, Journeyman, Craftsman/Supervisor, or Master Craftsman/Manager. All are transcribed on the CCAF transcript.

7.3. The Electronic Systems Technology (4VHP) program applies to 2EXXX career fields.

7.3.1. Degree Requirements: Individuals must hold the 5-skill level at the time of program completion.

	Semester hours
Technical Education	24
Leadership, Management, and Military Studies	6
Physical Education	4
General Education	15
Program Electives	15
Total	64

7.3.2. Technical Education (24 semester hours): A minimum of 12 semester hours of Technical Core subjects and courses must be applied and the remaining semester hours will be applied from Technical Core/Technical Elective subjects and courses.

7.3.3. Leadership, Management, and Military Studies (6 semester hours): Professional military education and/or civilian management courses. See CCAF General Catalog for application of civilian management courses.

7.3.4. Physical Education (4 semester hours): Satisfied upon completion of basic military training.

7.3.5. General Education (15 semester hours): Courses must meet the criteria for application of courses to the General Education requirement and be in agreement with the definitions of applicable General Education subjects/courses as outlined in the CCAF General Catalog.

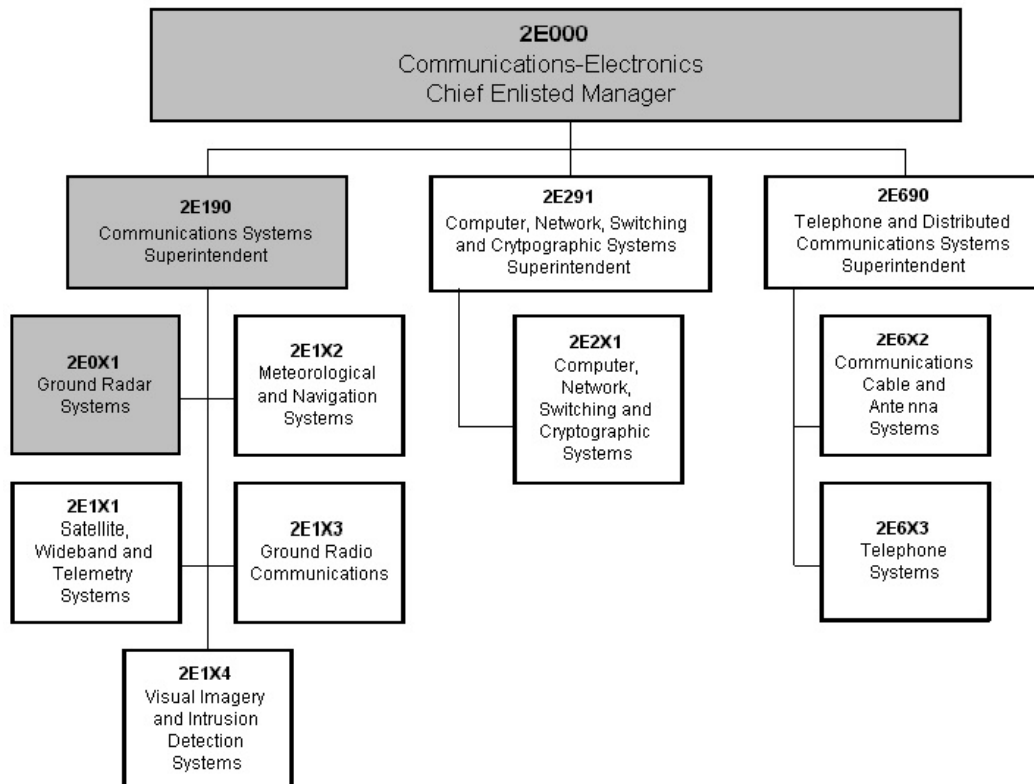
7.3.6. Program Elective (15 semester hours): Satisfied with applicable Technical Education; Leadership, Management, and Military Studies; or General Education courses, including natural science courses meeting General Education requirement application criteria. Six semester hours of CCAF degree applicable technical credit otherwise not applicable to this program may be applied.

7.4. See the current CCAF General Catalog for details regarding the Associates of Applied Science in Electronic Systems Technology. The catalog is available at your education officer or from <http://www.au.af.mil/au/ccaf>.

7.5. Additional off-duty education is a personal choice that is encouraged for all. Individuals desiring to become an AETC instructor should be actively pursuing an associate degree. A degreed faculty is necessary to maintain CCAF's accreditation through the Southern Association of Colleges and Schools.

8. Career Field Path. The following summarizes career progression and personnel allocations across the career ladder. 2E1XX and 2E0X1 personnel maintain their individual AFSC identifiers through the rank of MSgt. Upon promotion to SMSgt, AFSC 2E1X1, 2E1X2, 2E1X3, 2E1X4, and 2E0X1 merge to become a 2E190. At Chief, the 2E190 merges with other 2EXXX 9-level specialties to become a 2E000. Specific demographic information is available on the Web at <http://www.afpc.randolph.af.mil/demographics/demograf/CAFSC.html>.

2EXXX Career Field Progression



2E0X1 GROUND RADAR SYSTEMS EDUCATION AND TRAINING PATH	
EDUCATION AND TRAINING REQUIREMENTS	AVERAGE SEW ON TIME AND COMMENTS
BASIC MILITARY TRAINING SCHOOL	
APPRENTICE TECHNICAL SCHOOL (3-SKILL LEVEL)	Airman 6 months
UPGRADE TO JOURNEYMAN (5-SKILL LEVEL) Minimum 15 months OJT training (9 months for retrainees). Completion of all 2E051 CTG core tasks and 5-Level CDCs. Mandatory Specific AFJQSS/AFQTPs for equipment at assigned location. Mandatory Maintenance Management and Generic AFJQSS/AFQTPs for various unit level duties. Mandatory AETC Supplemental training courses as determined by MAJCOM Optional AFETS/CFS/SMT training as determined by MAJCOM Optional	A1C 16 months SrA 3 years Earliest 3 years HYT 10 years
AIRMAN LEADERSHIP SCHOOL (ALS) Attendance is limited to SSgt selectees or those attaining 48 months Total Active Federal Military Service (TAFMS) and who have not been selected for promotion to SSgt. Completion is mandatory before assuming the rank of SSgt. ANG/AFRC may complete by correspondence course. Mandatory	TRAINER: Any rank may qualify as a trainer provided they: attend a formal OJT Trainer course, are officially appointed by the commander, and are certified on the task they are training.
UPGRADE TO CRAFTSMAN (7-SKILL LEVEL) Minimum rank of SSgt. 12 months OJT training. Completion of all 2E071 CTG core tasks and AFQTP 2EXXX-201L, Communications-Electronics Work Center Manager's Handbook. Attendance at formal 7-level school. Must be 7-level to sew on TSgt. Mandatory Maintenance Management and Generic AFJQSS/AFQTPs for various unit level duties. Mandatory AETC Supplemental training courses as determined by MAJCOM Optional AFETS/CFS/SMT training as determined by MAJCOM Optional	SSgt 7.5 years Earliest 3 years HYT 20 years TSgt 12.5 years Earliest 5 years HYT 22 years CERTIFIER: Must be a SSgt and possess at least a 5-skill level or equivalent experience (civilian), attend a formal OJT Certifier course, be officially appointed by the commander and certified on the task they are certifying. Be a person other than the trainer.

2E0X1 GROUND RADAR SYSTEMS EDUCATION AND TRAINING PATH	
EDUCATION AND TRAINING REQUIREMENTS	AVERAGE SEW ON TIME AND COMMENTS
<p>NONCOMMISSIONED OFFICER ACADEMY (NCOA). Attendance is limited to TSgt and TSgt selectees. Completion is mandatory before assuming the rank of MSgt. ANG/AFRC may attend in-residence as SSgt or TSgt or complete correspondence course.</p> <p>NCOA Correspondence Course Optional</p>	<p>MSgt 16 years Earliest 8 years HYT 24 years</p>
<p>USAF SENIOR NONCOMMISSIONED OFFICER ACADEMY (SNCOA) Attendance is limited to SMSgt, SMSgt selectees, and selected MSgts. Completion is mandatory before assuming the rank of CMSgt. Mandatory</p> <p>SNCOA Correspondence Course Optional</p> <p>ANG/AFRC may complete by correspondence course. ANG/AFRC MSgts may attend in-residence. Mandatory</p>	<p>SMSgt 19.2 years Earliest 11 years HYT 26 years</p>
<p>UPGRADE TO SUPERINTENDENT (9-SKILL LEVEL)</p> <p>Minimum rank of SMSgt.</p> <p>Complete SNCOA Mandatory</p> <p>Complete AFQTP 2EXXX-201LB, Communications-Electronics Manager's Handbook. Mandatory</p> <p>Maintenance Management and Generic AFJQSs/AFQTPs for various unit level duties. Mandatory</p>	<p>CMSgt 21.5 years Earliest 14 years HYT 30 years</p>

NOTE 1: Published sew on times are Air Force averages. Refer to the Air Force Personnel Center's homepage to determine career field specific information: <http://www.afpc.randolph.af.mil/eprom>.

NOTE 2: See Part II, Section D for a list of AFJQSs/AFQTPs, AETC supplemental, and AFETS/CFS/SMT training.

Section C - Skill Level Training Requirements

9. Purpose. The various skill levels in the career field are defined in terms of tasks and knowledge requirements for each skill level in the Ground Radar Systems career field of the Communications-Electronics Systems career ladder. They are stated in broad, general terms and establish the standards of performance. An all encompassing core task list has not been developed for this specialty because of the diversity of the missions supported and the equipment installed to meet mission requirements. Core tasks, knowledge items, and skill requirements for this specialty are identified in the STS, CDCs, AFJQSs/AFQTPs, etc. Completion of the mandatory 3-level skill awarding course, CDCs, 7-level course, and applicable AFJQSs/AFQTPs define the Air Force core tasks for this specialty.

10. Specialty Qualification Requirements.

10.1. Apprentice (3-Level) Training.

KNOWLEDGE	Electronics principles and digital techniques, including transistors and solid state component theory that applies to ground radar systems Maintenance data processing systems Wiring diagrams, circuit diagrams, schematic diagrams, and technical orders Air Force maintenance and supply procedures Personnel management and administrative procedures.
EDUCATION	Completion of high school with courses in algebra, geometry, trigonometry, and physics is desirable.
TRAINING	Electronics Principles, course E3AQR2E031 481 (PDS Code PO1) (See Attachment 1 of the STS for course training standard) Ground Radar Systems Apprentice, course E3ABR2E031 002 (PDS Code 9KY) (See Attachment 2 of the STS for course training standard)
EXPERIENCE	None required.
OTHER	Normal color vision is required for entry into this AFSC as defined by AFMAN 48-123, <i>Medical Examination and Standards</i> . Qualification to operate government vehicles according to AFI 24-301, <i>Vehicle Operations</i> . Eligibility for a Secret security clearance according to AFI 31-501, <i>Personnel Security Program Management</i> , is mandatory for award and retention of this AFSC.
IMPLEMENTATION	Entry into training is accomplished by reserving a position in the career field upon entry into the Air Force.

10.2. Journeyman (5-Level) Training.

KNOWLEDGE	No additional knowledge requirements.
TRAINING	No AETC training requirement.
EXPERIENCE	<p>Qualification and possession of AFSC 2E031</p> <p>Testing, calibrating, or repairing ground radar systems and associated communications and identification equipment</p> <p>Use of test equipment and interpretation of results</p> <p>Completion of the 2E051 Career Development Course</p> <p>Completion of all 2E051 CTG core tasks (See Attachment 3 of the STS for career training guide)</p> <p>Completion of applicable equipment AFJQSS/AFQTPs</p> <p>Completion of all local tasks assigned for the duty position</p>
OTHER	Eligibility for a Secret security clearance according to AFI 31-501, <i>Personnel Security Program Management</i> , is mandatory for award and retention of this AFSC.
IMPLEMENTATION	Entry into formal upgrade is initiated upon assignment to the individual's first duty station. Qualification training is initiated anytime individuals are assigned duties for which they are not qualified. Use CDCs and AFJQSS/AFQTPs concurrently to obtain the necessary qualification for refresher and cross-utilization training.

10.3. Craftsman (7-Level) Training.

KNOWLEDGE	No additional knowledge requirements.
TRAINING	<p>Communications-Electronics Career Advancement Course (In-residence), E3ACR2EX7X 002 (PDS 7SI) [Active Duty only]</p> <p>Communications-Electronics Career Advancement Course (Distance learning), E6ADL2EX7X 000 (PDS Code 4VI) [Guard/Reserve only]</p> <p>Communications-Electronics Career Advancement Course (Self-paced), E6AZS2EX7X 006 (PDS X2J) [Prerequisite for Guard/Reserve members prior to attending the above distance learning course]</p>
EXPERIENCE	<p>Qualification and possession of AFSC 2E051</p> <p>Performing or managing functions such as: siting, installing, repairing, overhauling, or modifying ground radar systems and associated communications and identification equipment</p> <p>Completion of all 2E071 CTG core tasks (See Attachment 4 of the STS for career training guide)</p> <p>Completion of AFQTP 2EXXXX-201L, Communications-Electronics Work Center Manager's Handbook</p> <p>Completion of applicable equipment/unit management function AFJQSS/AFQTPs</p>
OTHER	Eligibility for a Secret security clearance according to AFI 31-501, <i>Personnel Security Program Management</i> , is mandatory for award and retention of this AFSC.
IMPLEMENTATION	Entry into formal upgrade training is initiated when individuals obtain the necessary rank and skill level. Qualification training is initiated anytime an individual is assigned duties for which they are not qualified. Use CDCs and AFJQSS/AFQTPs concurrently to obtain the necessary qualification for refresher and cross-utilization training.

10.4. Superintendent (9-Level) Training.

KNOWLEDGE	Electronic principles theory and its application to ground radio, meteorological and navigation, combat camera, imagery, video, television, telemetry systems, space systems, intrusion detection, and satellite and microwave communications facilities, systems, and equipment; and their interoperability The communications and computer elements of a typical air base Interpretation of wiring and logic diagrams, blueprints, and technical orders
TRAINING	No AETC training requirement.
EXPERIENCE	Qualification and possession of AFSC 2E071, 2E171, 2E172, 2E173, or 2E174 Experience is mandatory managing or directing functions such as installing, maintaining, repairing, or modifying the various systems and related equipment of the feeder specialties. AFQTP 2EXXXX-201LB, Communications-Electronics Manager's Handbook
OTHER	Eligibility for a Secret security clearance according to AFI 31-501, <i>Personnel Security Program Management</i> , is mandatory for award and retention of this AFSC.
IMPLEMENTATION	Entry into OJT is initiated when individuals are selected for the rank of SMSgt. Qualification training is initiated anytime individuals are assigned duties for which they are not qualified.

10.5. Training Sources.

10.5.1. Electronic Principles training - 332 TRS, Keesler AFB, MS at <https://wwwmil.keesler.af.mil/>.

10.5.2. AFSC specific training - 338 TRS, Keesler AFB, MS. at <https://wwwmil.keesler.af.mil/>.

10.5.3. 2EX7X Communications-Electronics Career Advancement course (7-Level School) – 338 TRS, Keesler AFB, MS at <https://wwwmil.keesler.af.mil/>.

10.5.4. CDC 2E051 is available for upgrade purposes through the unit training manager. For individual qualification and cross-utilization training, CDCs are ordered through the unit training office.

10.5.5. AFJQSS/AFQTPs are Air Force publications and are mandatory for use in qualification training. They are developed by the 81 TRSS (Q-Flight), Keesler AFB, MS and may be downloaded from <https://wwwmil.keesler.af.mil/81trss/qflight/welcome.html>. Procedures for requesting development of AFJQSS/AFQTPs are contained in AFI 36-2233, *Air Force On-the-Job Training Products for Communications-Electronics Enlisted Specialty Training*. AFJQSS/AFQTPs are listed in Part II, Section D, of this CFETP.

10.5.6. Air Force Engineering and Technical Service (AFETS) (course listing found at https://www.afca.scott.af.mil/c-e_maint/afets.htm), Contract Field Service (CFS), and Special Maintenance Team (SMT) training may be requested to provide on-site training. The AFETS program is outlined in AFI 21-110, *Engineering and Technical Services Management and Control*. Direct requests for AFETS, CFS, or SMT training to your MAJCOM.

Section D - Resource Constraints

11. Purpose. This section identifies known resource constraints that preclude optimal/desired training from being developed or conducted, including information such as part numbers, national stock numbers, number of units required, cost, manpower, etc. Included are narrative explanations of each resource constraint and an impact statement describing what effect each constraint has on training. Finally, this section includes actions required, OPR, and target completion date. Resource constraints will be, at a minimum, reviewed and updated annually.

12. Apprentice (3-Level) Training.

12.1. Constraints: None.

12.1.1. Impact. N/A

12.1.2. Resources Required. N/A

12.1.3. Action Required. N/A

12.2. OPR/Target Completion Date. N/A

13. Journeyman (5-Level) Training.

13.1. Constraints: None.

13.1.1. Impact. N/A

13.1.2. Resources Required. N/A

13.1.3. Action Required. N/A

13.2. OPR/Target Completion Date. N/A

14. Craftsman (7-Level) Training.

14.1. Constraints: None.

14.1.1. Impact. N/A

14.1.2. Resources Required. N/A

14.1.3. Action Required. N/A

14.2. OPR/Target Completion Date. N/A

Section E - Transition Training Guide

15. There are currently no transition training requirements. This area is reserved.

PART II

Section A - Specialty Training Standard

1. Implementation. The implementation of training in support of this STS is with the class beginning 20011005 and graduating 20020401.

2. Purpose. As prescribed in AFI 36-2201, this STS:

2.1. The Course Training Standards (CTS) at Attachments 1 and 2:

2.1.1. Establishes the training requirements for airmen to perform 3-skill level duties in the Ground Radar Systems career ladder of the Airman Communications-Electronics Systems career field. The training tasks are based on an analysis of duties in AFMAN 36-2108 for AFSC 2E031.

2.1.2. Provides the basis for the development of more detailed training materials, training objectives, and training evaluation instruments for the course.

2.1.3. Shows formal training requirements. Attachment 1 lists the Electronic Principles requirements for this specialty and contains the proficiency code key pertaining to this attachment. Students receive this training through AETC course E3AQR2E031 481.

2.1.4. Attachment 2 contains a list of behavioral statements that describe knowledge and job performance requirements the graduate demonstrates on the job as a result of training received in course E3ABR2E031 002 as described in the Air Force Education and Training Course Announcements (ETCA) database (formerly AFCAT 36-2223, USAF Formal Schools Catalog). Part I, Section D, and the Preface to Attachment 2 explains constraints and/or guidelines to training. When notes or explanations describe constraints in the skill awarding course, they indicate that training on those items is restricted due to the limitation described.

2.2. The Five-Level Career Training Guide (CTG) at Attachment 3:

2.2.1. Provides a complete list of continuation training requirements for the award of AFSC 2E051. Attachment 3 contains the behavioral code key used to indicate the type of training provided by CDCs.

2.2.2. Identifies the mandatory task and knowledge training that is required for the 5-skill level in the Ground Radar Systems career field of the Airman Communications-Electronic Systems career ladder. These are based on an analysis of duties and responsibilities as outlined in AFMAN 36-2108.

2.3. The Seven-Level Career Training Guide (CTG) at Attachment 4:

2.3.1. Provides a complete list of continuation training requirements for the award of AFSC 2E071. Attachment 4 contains the behavioral code key used to indicate the type of training that will be provided.

2.3.2. Identifies the mandatory task and knowledge training that is required for the 7-skill level in the Ground Radar Systems ladder of the Airman Communications-Electronics Systems career field. These are based on an analysis of duties and responsibilities as outlined in AFMAN 36-2108.

2.4. The CTGs at Attachments 3 and 4:

2.4.1. Provide OJT certification columns to record completion of task and knowledge training requirements. Use automated training management systems to document technician qualifications, if available. Task certification must show a start and stop date.

2.4.2. Become a job qualification standard for OJT when placed in AF Form 623, On-the-Job Training Record, and used according to AFI 36-2201. OJT tasks in column 1 are trained to the go/no go level. Go means the individual can perform the task without assistance and meet local requirements for accuracy, timeliness, and correct use of procedures.

2.4.2.1. Training Documentation. Document and certify completion of training. Identify duty position requirements by circling the subparagraph number next to the task statement. Complete the following columns in Part II of the CFETP:

2.4.2.1.1. Initial Certification. Evaluate qualifications and when verified, certify using:

2.4.2.1.1.1. Core/Critical Tasks. Start date, stop date, trainee's initials, trainer's initials, and certifier's initials.

2.4.2.1.1.2. Non-Core/Non-Critical Tasks. Start date, stop date, trainee's initials, and trainer's initials.

2.4.2.1.2. Transcribing from Old Document to CFETP. Evaluate current qualifications and when verified recertify using:

2.4.2.1.2.1. Tasks Previously Certified and Required in Current Duty Position (Core/Critical Tasks). Current date as completion date, trainee's initials, and certifier's initials.

2.4.2.1.2.2. Tasks Previously Certified and Required in Current Duty Position (Non-Core/Non-Critical Tasks). Current date as completion date, trainee's initials, and trainer's initials.

2.4.2.1.2.3. Tasks Previously Certified but Not Required in Current Duty Position. Carry forward only the previous completion date of certification (not the initials of another person). If and when transcribed tasks become duty position requirements, recertify using standard certification procedures.

2.4.2.1.2.4. The person whose initials appear in the trainer or certifier block during the transcription process must meet the requirements of their prescribed role.

2.4.2.1.2.5. Give the member the old CFETP upon completion of transcription.

2.4.2.1.3. Documenting Career Knowledge. When a CDC is not available: the supervisor identifies STS training references the trainee requires for career knowledge and ensures, as a minimum, that trainees cover the mandatory items in AFMAN 36-2108. For two time CDC course exam failures, supervisors identify all STS items corresponding to the areas covered by the CDC. The trainee completes study of the STS references, undergoes evaluation by the task certifier, and receives certification on the STS. NOTE: Career knowledge must be documented prior to submitting a CDC waiver.

2.4.2.1.4. Decertification and Recertification. When an airman is found to be unqualified on a task previously certified, the supervisor lines through the previous certification or deletes the previous certification when using an automated system. Appropriate remarks are entered on the AF Form 623A, On-The-Job Training Record Continuation Sheet, as to the reason for decertification. The individual is recertified using the normal certification process.

2.4.3. Indicates career knowledge provided in the 5-skill level CDCs. See Air Force Institute for Advanced Distributed Learning (AFIADL) catalog maintained by the unit OJT manager for current CDC listings or go to <http://www.maxwell.af.mil/au/afiadl>.

2.4.4. Are guides for development of promotion tests used in the Weighted Airman Promotion System (WAPS). Specialty Knowledge Tests (SKT) are developed at the USAF Occupational Measurement Squadron by senior NCOs with extensive practical experience in their career fields. The tests sample knowledge of CTG subject matter areas judged by test development team members to be most appropriate for promotion to higher grades. Questions are based upon study references listed in the WAPS catalog. Individual responsibilities are listed in chapter 1 of AFI 36-2605, *Air Force Military Personnel Testing System*. WAPS is not applicable to the Air National Guard or Air Reserve forces.

3. Recommendations. Comments and recommendations are invited concerning the quality of AETC training. A Customer Service Information Line (CSIL) has been installed for the supervisors' convenience. For a quick response to concerns, call our CSIL at DSN 597-4566, or fax us at DSN 597-3790, or e-mail us at, 81trg-tget@keesler.af.mil. Reference this CTS and identify the specific area of concern (paragraph, training standard element, etc).

BY ORDER OF THE SECRETARY OF THE AIR FORCE

OFFICIAL

MICHAEL E. ZETTLER, Lieutenant General, USAF
Deputy Chief of Staff /Installations & Logistics

Attachments:

1. Electronic Principles Course Training Standard
2. Course Training Standard, 2E031
3. Five-Level Career Training Guide, 2E051
4. Seven-Level Career Training Guide, 2E071

PREFACE

NOTE 1: Dashed items in this CTS are not part of the original CTS created at the August 1999 Electronic Principles U&TW however, they are the specific objectives taught in the Electronic Principles course designed to meet the CTS requirements.

NOTE 2: Unless otherwise stated, students may be allowed two assists from the instructor and still successfully achieve the proper level of proficiency. An instructor assist is anytime an instructor must intercede to provide guidance to a student which leads to a satisfactory completion of the objective or to prevent the student from continuing in a manner that will lead to an unsatisfactory conclusion, safety violation, or damage to equipment.

NOTE 3: All objectives are trained during wartime.

PROFICIENCY CODE KEY		
	SCALE VALUE	DEFINITION: The individual
Task Performance Levels	1	Can do simple parts of the task. Needs to be told or shown how to do most of the task. (EXTREMELY LIMITED)
	2	Can do most parts of the task. Needs help only on hardest parts. (PARTIALLY PROFICIENT)
	3	Can do all parts of the task. Needs only a spot check of completed work. (COMPETENT)
	4	Can do the complete task quickly and accurately. Can tell or show others how to do the task. HIGHLY PROFICIENT)
*Task Knowledge Levels	a	Can name parts, tools, and simple facts about the task. (NOMENCLATURE)
	b	Can determine step-by-step procedures for doing the task. (PROCEDURES)
	c	Can identify why and when the task must be done and why each step is needed. (OPERATING PRINCIPLES)
	d	Can predict, isolate, and resolve problems about the task. (COMPLETE THEORY)
**Subject Knowledge Levels	A	Can identify basic facts and terms about the subject. (FACTS)
	B	Can identify relationship of basic facts and state general principles about the subject. (PRINCIPLES)
	C	Can analyze facts and principles and draw conclusions about the subject. (ANALYSIS)
	D	Can evaluate conditions and make proper decisions about the subject. (EVALUATION)
EXPLANATIONS		
<p>* A task knowledge scale value may be used alone or with a task performance scale value to define a level of knowledge for a specific task. (Examples: b and 1b)</p> <p>** A subject knowledge scale value is used alone to define a level of knowledge for a subject not directly related to any specific task or for a subject common to several tasks.</p> <p>X This mark is used alone instead of a scale value to show that no proficiency training is provided in the course.</p> <p>- This mark is used alone in course columns to show that training is required, but not given, due to limitations in resources.</p>		

PROFICIENCY
CODE

1. ELECTRONIC SUPPORT SUBJECTS.

- 1.1. Safety. B
- Identify safety precautions pertaining to electronics.
- 1.2. First Aid. B
- Identify first aid procedures for electrical injuries.
- 1.3. Electrostatic Discharge (ESD) Control. B
- Identify electrostatic discharge (ESD) sensitive device control methods.
- 1.4. Electromagnetic Effects (EMP/EMI). B
- Identify the techniques used to protect electronic equipment from the effects of electromagnetics (EMP/EMI).
- 1.5. Metric Notation.
- 1.5.1. Powers of Ten. B
- Convert decimal numbers to scientific notation and vice versa.
 - Perform math operations of numbers expressed as scientific notation.
- 1.5.2. Electrical Prefixes. B
- Convert decimal numbers to electrical prefixes and vice versa.
 - Convert electrical prefix values to other equivalent electrical prefix values.

2. USE TEST EQUIPMENT.

- 2.1. Analog Multimeter. 2b
- Identify the operating principles of the analog multimeter.
 - Identify procedures for analog multimeter usage.
 - Measure selected electrical values using analog and digital multimeters.
- 2.2. Digital Multimeter. 2b
- Identify the operating principles of the digital multimeter.
 - Identify procedures for digital multimeter usage.
 - Measure selected electrical values using analog and digital multimeters.
- 2.3. Oscilloscope. 2b
- Identify oscilloscope operating principles.
 - Identify the procedures for oscilloscope usage.
 - Measure selected electrical values using an oscilloscope and signal generator.
- 2.4. Signal Generator. 2b
- Identify the procedures for signal generator usage.
 - Measure selected electrical values using an oscilloscope and signal generator.

3. BASIC CIRCUITS.

- 3.1. Direct Current (DC).
- 3.1.1. Terms. B
- Identify terms associated with direct current (DC) principles

PROFICIENCY
CODE

3.1.2. Theory.	B
<ul style="list-style-type: none">– Identify circuit schematic symbols.– Identify basic circuit operating principles.– Determine the results of parameter changes on DC resistive circuits.– Identify resistor voltage divider operating principles.	
3.1.3. Calculations.	B
<ul style="list-style-type: none">– Calculate values for a series resistive DC circuit diagram.– Calculate values for a parallel resistive DC circuit diagram.– Calculate values for a series-parallel resistive DC circuit diagram.	
3.2. Alternating Current (AC).	
3.2.1. Terms.	B
<ul style="list-style-type: none">– Identify terms associated with AC principles.	
3.2.2. Calculations.	B
<ul style="list-style-type: none">– Calculate AC voltage values.– Calculate AC frequency/time values.	
4. BASIC CIRCUIT COMPONENTS.	
4.1. Resistors.	
4.1.1. Theory.	B
<ul style="list-style-type: none">– Identify resistor characteristics.	
4.1.2. Color Code.	B
<ul style="list-style-type: none">– Using resistor color code, determine the ohm/tolerance value of resistors.	
4.1.3. Troubleshoot.	2b
<ul style="list-style-type: none">– Troubleshoot a series-parallel resistive circuit to a faulty resistor.	
4.2. Inductors.	
4.2.1. Theory.	B
<ul style="list-style-type: none">– Identify characteristics of inductors.– Identify inductor DC operating principles.– Identify inductor AC operating principles.	
4.2.2. Troubleshoot.	2b
<ul style="list-style-type: none">– Troubleshoot a faulty inductor in a circuit.	
4.3. Capacitors.	
4.3.1. Theory.	B
<ul style="list-style-type: none">– Identify characteristics of capacitors.– Identify capacitor DC operating principles.– Identify capacitor AC operating principles.	
4.3.2. Troubleshoot.	2b
<ul style="list-style-type: none">– Troubleshoot a faulty capacitor in circuit.	

PROFICIENCY
CODE

4.4. Resistive-Capacitive-Inductive (RCL) Circuit Theory.

4.4.1. Basic.

- Identify RCL circuit operating principles.

B

4.4.2. Resonant.

- Identify resonant RCL circuit operating principles.

B

4.4.3. Frequency Sensitive Filter.

- Identify frequency sensitive filter operating principles.

B

5. ELECTROMAGNETIC DEVICES.

5.1. Transformers.

5.1.1. Theory.

- Identify characteristics of transformers.
- Identify transformer operating principles.

B

5.1.2. Troubleshoot.

- Troubleshoot a faulty transformer.

2b

5.2. Relays and Solenoids.

5.2.1. Theory.

- Identify relay and solenoid operating principles.

B

5.2.2. Troubleshoot Relays.

- Troubleshoot a faulty relay in a circuit.

2b

5.3. Motor Theory.

5.3.1. Direct Current.

- Identify DC motor operating principles.

B

5.3.2. Alternating Current.

- Identify AC motor operating principles.

B

5.4. Generator Theory.

5.4.1. Direct Current.

- Identify DC generator operating principles.

B

5.4.2. Alternating Current.

- Identify AC generator operating principles.

B

5.5. Synchro/Servo.

5.5.1. Theory.

- Identify servo/synchro operating principles.

B

PROFICIENCY
CODE

5.5.2. Fault Isolate. 2b
– Identify servo/synchro fault isolation procedures.

5.6. Transducer Theory. B
– Identify transducer operating principles.

6. SOLID STATE DEVICES.

6.1. Diodes.

6.1.1. Theory. B
– Identify solid state diode operating principles.

6.1.2. Troubleshoot. 2b
– Identify diode fault isolation techniques.
– Troubleshoot a diode circuit.

6.2. Bipolar Junction Transistors.

6.2.1. Theory. B
– Identify bipolar transistor operating principles.

6.2.2. Troubleshoot. 2b
– Troubleshoot a bipolar junction transistor circuit.

6.3. Special Purpose Device Theory.

6.3.1. Zener Diode. B
– Identify zener diode operating principles.

6.3.2. Light Emitting Diode (LED). B
– Identify LED operating principles.

6.3.3. Liquid Crystal Display (LCD). B
– Identify LCD operating principles.

6.3.4. Integrated Circuits (IC). B
– Identify integrated circuit (IC) operating principles.

6.3.5. Metal Oxide Semiconductor Field Effect Transistor (MOSFET). B
– Identify MOSFET operating principles.

6.3.6. Operational Amplifier (OP AMP). B
– Identify OP AMP operating principles.

7. TRANSISTOR AMPLIFIER CIRCUITS.

7.1. Theory. B
– Identify the transistor amplifier configurations.
– Identify common emitter amplifier operating principles.
– Identify common collector amplifier operating principles.
– Identify common base amplifier operating principles.

PROFICIENCY
CODE

7.2. Stabilization. <ul style="list-style-type: none">– Identify transistor amplifier temperature stabilization operating principles.	B
7.3. Coupling. <ul style="list-style-type: none">– Identify coupling circuit operating principles.	B
7.4. Troubleshoot. <ul style="list-style-type: none">– Troubleshoot a transistor amplifier circuit to a faulty component.	2b
8. POWER SUPPLY CIRCUITS.	
8.1. Theory.	
8.1.1. Rectifiers. <ul style="list-style-type: none">– Identify power supply rectifier operating principles.	B
8.1.2. Filters. <ul style="list-style-type: none">– Identify power supply filter operating principles.	B
8.1.3. Voltage Regulators. <ul style="list-style-type: none">– Identify shunt regulator operating principles.– Identify series electronic voltage regulator (EVR) operating principles.	B
8.2. Troubleshoot. <ul style="list-style-type: none">– Identify types of malfunctions in a filtered power supply circuit.– Troubleshoot a filtered power supply circuit to a faulty component.– Troubleshoot a series EVR circuit to a faulty component.	2b
9. WAVE GENERATING CIRCUITS.	
9.1. Theory.	
9.1.1. Oscillators. <ul style="list-style-type: none">– Identify the characteristics of oscillator circuits.– Identify LC oscillator operating principles.– Identify crystal oscillator operating principles.	B
9.1.2. Multivibrators. <ul style="list-style-type: none">– Identify astable multivibrator operating principles.– Identify monostable multivibrator operating principles.– Identify bistable multivibrator operating principles.	B
9.1.3. Waveshaping Circuits. <ul style="list-style-type: none">– Identify RC integrating/differentiating circuit operating principles.– Identify sawtooth generator operating principles.	B
9.2. Fault Isolate. <ul style="list-style-type: none">– Fault isolate a wave generating circuit.	2b

PROFICIENCY
CODE

10. DIGITAL NUMBERING SYSTEMS.

10.1. Conversions.

10.1.1. Binary.

- Identify principles of binary conversions.

B

10.1.2. Octal.

- Identify principles of octal conversions.

B

10.1.3. Hexadecimal.

- Identify principles of hexadecimal conversions.

B

10.1.4. Binary Coded Decimal.

- Identify principles of binary coded decimal (BCD) conversions.

B

10.2. Binary Math Operations.

- Determine the results of math operations.

B

11. DIGITAL LOGIC CIRCUITS.

11.1. Theory.

11.1.1. Gates.

- Identify principles of logic gate operation.

B

11.1.2. Flip-Flops.

- Identify principles of flip-flop operation.

B

11.1.3. Counters.

- Identify operating principles of counters.

B

11.1.4. Registers.

- Identify operating principles of registers.

B

11.1.5. Combinational Logic Circuits.

- Identify operating principles of combinational logic circuits.

B

11.2. Troubleshoot.

- Troubleshoot a combinational logic circuit.

B

11.3. Digital-to-Analog (D/A) and Analog-to-Digital (A/D) Converter Theory.

- Identify operating principles of a digital-to-analog (D/A) converters.
- Identify operating principles of analog-to-digital (A/D) converters.

B

12. BASIC COMPUTER FUNDAMENTALS.

12.1. Computer Theory.

12.1.1. Hardware.

- Identify computer hardware operating principles.

B

PROFICIENCY
CODE

12.1.2. Software.	
12.1.2.1. Operating Systems.	B
– Identify computer operating systems principles.	
12.1.2.2. Virus Protection.	B
– Identify computer virus protection operating principles.	
12.1.2.3. Diagnostics.	B
– Identify computer diagnostics operating principles.	
12.1.2.4. Applications.	B
– Identify computer applications operating principles.	
12.1.3. Peripherals.	B
– Identify computer peripheral devices operating principles.	
12.2. Network Theory.	
12.2.1. Components.	B
– Identify basic network hardware component operating principles.	
12.2.2. Types.	B
– Identify basic network communication system types.	
12.2.3. Topologies.	B
– Identify basic network physical topologies.	
12.2.4. Communication Mediums.	B
– Identify network medium operating principles.	
13. BASIC COMMUNICATIONS THEORY.	
13.1. Antenna.	B
– Identify antenna operating principles.	
13.2. Transmission Lines.	B
– Identify transmission line theory of operation.	
13.3. Waveguides.	B
– Identify waveguide operating principles.	
13.4. Transmitters.	
13.4.1. Amplitude Modulation (AM).	B
– Identify AM transmitter operating principles.	
13.4.2. Frequency Modulation (FM).	B
– Identify FM transmitter operating principles.	

PROFICIENCY
CODE

13.5. Receivers.

13.5.1. AM Receivers.

- Identify AM receiver operating principles.

B

13.5.2. FM Receivers.

- Identify FM receiver operating principles.

B

14. SOLDER AND DESOLDER.

14.1. Terminal Connection.

- Solder a wire to a terminal connector.
- Desolder a wire from a terminal connector.

2b

14.2. Printed Circuit Board (PCB).

- Solder three components to a PCB.
- Desolder three components from a PCB.

2b

14.3. Multipin Connector.

- Solder a tinned wire into a pin for use in a multipin connector.
- Desolder a wire from a pin used in a multipin connector.

2b

14.4. Coaxial Connector.

- Solder a coaxial connector center contact to a coaxial cable.
- Desolder a coaxial connector center contact from a coaxial cable.

2b

15. ASSEMBLE SOLDERLESS CONNECTORS.

15.1. Crimped Connection.

- Splice two wires together using a crimp connector.
- Crimp a terminal lug to a wire.

2b

15.2. Coaxial Connector.

- Assemble a solderless coaxial cable connector to a coaxial cable.

2b

15.3. Multipin Connector.

- Crimp a wire into a pin for use in a multipin connector.
- Assemble a multipin connector.

2b

PREFACE

NOTE 1: Unless otherwise stated in the objective, the student may be allowed two assists from the instructor and still successfully achieve the proper level of proficiency. An instructor assist is defined as anytime an instructor must intercede to provide guidance to a student which leads to a satisfactory completion of the objective or to prevent a student from continuing in a manner which will lead to an unsatisfactory conclusion, safety violation, or damage to the equipment.

NOTE 2: All equipment related objectives are performed by following procedures from technical orders, technical manuals, or student instructional material developed by the training facility. Test equipment used throughout the course includes:

Oscilloscope	Crystal Detectors
Frequency Counters	Attenuators
Sweep Generators	Modulator
Frequency Generator	Transit
Signal Generator	IFF/SIF Radar Test Set, TPM-25
Power Meters	Transmission Line Test Set, AM-48
Wavemeters	Video Signal Processor Test Set, TPM-32
Spectrum Analyzers	Radar Test Set, AN/UPM-145
Digital Multimeter	IFF/SIF Radar Test Set, AN/UPM-155
Noise Figure Meter	

NOTE 3: The equipment items identified below are used as training vehicles within the skill awarding course since it incorporates most of the basic principles and procedures found in the remainder of the AFSC's equipment inventory.

AN/GPN-20	AN/GPN-22
AN/TPS-75	AN/UYQ-27
AN/TPX-42	PIDP II
OD-153	DBRITE

NOTE 4: All objective references are performed as terminal objectives. Knowledge required to perform CTS elements is inherent in each objective. This includes, but is not limited to, defining the capabilities, limitations, and theory of operation of the stated item.

NOTE 5: All objectives are trained during wartime.

1. BASIC ELECTRONIC PRINCIPLES.

1.1. Identify operating characteristics of special purpose solid state devices.

1.1.1. Silicon Controlled Rectifier (SCR).

1.1.2. Tunnel diode.

1.1.3. Positive Intrinsic Negative (PIN) diode.

1.2. Identify operating characteristics of electron tubes.

1.3. Identify operating characteristics of amplifiers.

1.4. Identify operating characteristics of limiter circuits.

1.5. Identify operating characteristics of clamper circuits.

1.6. Identify operating characteristics of pulse modulated transmitters.

1.7. Identify operating characteristics of pulse modulated receivers.

2. BASIC RADAR PRINCIPLES.

2.1. Describe the general principles of a typical radar system.

2.1.1. Angle of reflection/incidence.

2.1.2. Velocity of radio waves.

2.1.3. Echo principle.

2.1.4. Radar mile.

2.1.5. Range.

2.1.6. Azimuth.

2.1.7. Frequency characteristics.

2.1.7.1. Pulse Recurrence Time (PRT).

2.1.7.2. Pulse Recurrence Frequency (PRF)/Pulses Per Second (PPS).

2.1.7.3. Pulse Width

2.1.8. Resolution.

2.1.8.1. Range.

2.1.8.2. Azimuth.

2.2. Describe the equipment types used to support the:

2.2.1. Air Traffic Control mission (fixed and deployable).

2.2.2. Aircraft Control and Warning mission.

2.2.3. Weather radar mission.

2.3. Describe the purpose of radar assemblies and subassemblies.

2.3.1. Synchronizers.

2.3.2. Transmitters.

2.3.2.1. Magnetron.

2.3.2.2. Traveling wave tube.

2.3.2.3. Klystron.

2.3.2.4. Twystron.

2.3.3. Receivers.

2.3.3.1. Normal.

2.3.3.2. Moving target indicator (MTI).

2.3.3.3. Height processing.

2.3.4. Indicators.

2.3.4.1. Planned position indicator (PPI).

2.3.4.2. Raster scan.

2.3.4.3. Beta scan.

2.3.5. Antennas.

2.3.5.1. Feedhorn.

2.3.5.2. Phased array.

2.3.5.3. IFF/SIF.

2.3.5.4. Slotted waveguide.

2.3.6. RF Devices.

2.3.6.1. Pressurized waveguide.

2.3.6.2. Duplexers/diplexers.

2.3.6.3. Multiplexers/RF switch.

2.3.6.4. Rotary joint.

2.3.6.5. Transmit-receive (TR).

2.3.6.6. Directional couplers/bi-directional couplers.

2.3.6.7. RF filters.

2.3.6.8. Polarizers.

2.3.7. Antenna positioning systems.

2.3.8. Video processors.

2.3.9. Performance monitors/built-in test equipment (BITE).

2.3.10. Integrated computer systems.

2.3.11. Remoting and control systems.

3. GENERIC MAINTENANCE TASKS.

3.1. Locate elements such as unit, module, row, column, component, pin, connector, or test point using an alphanumeric designator.

3.2. Perform a visual inspection of system cabinets, cables, and ancillary equipment.

3.3. Research technical publications for theory of operations, preventive maintenance instructions, alignment procedures, and part numbers.

4. TEST EQUIPMENT.

4.1. Operate common radar test equipment:

4.1.1. Crystal detector.

4.1.2. Attenuators.

4.1.3. Pulse generators.

4.1.4. Digital multimeter.

4.1.5. Signal generators.

4.1.6. Sweep generators.

4.1.7. Frequency counters.

4.1.8. Oscilloscope.

4.2. Operate special radar test equipment.

4.2.1. Power meters.

4.2.2. Wavemeters.

4.2.3. Noise figure meter.

4.2.4. Spectrum analyzer.

4.2.5. Radar test set, UPM-145.

4.2.6. IFF/SIF radar test set, TPM-25.

4.2.7. Video signal processor, TPM-32.

4.2.8. IFF/SIF radar test set, UPM-155.

4.2.9. Transmission line test set, AM-48.

5. POWER SUPPLIES.

5.1. High Voltage Power Supply (HVPS).

5.1.1. Describe the theory, capabilities, and limitations of a HVPS.

5.1.2. Verify HVPS operation.

5.1.3. Align HVPS.

5.1.4. Isolate malfunction(s) to a line replaceable unit (LRU).

5.1.5. Remove and replace LRU.

5.2. Low Voltage Power Supply (LVPS).

5.2.1. Describe the theory, capabilities, and limitations of an LVPS.

5.2.2. Verify LVPS operation.

5.2.3. Align LVPS.

5.2.4. Isolate malfunction to LRU.

5.2.5. Remove and replace LRU.

6. POWER DISTRIBUTION SYSTEMS.

6.1. Describe the theory, capabilities, and limitations of power distribution systems.

7. GROUNDING SYSTEMS.

7.1. Describe the theory, capabilities, and limitations of grounding systems.

8. TIMING AND SYNCHRONIZATION CIRCUIT.

8.1. Describe the theory, capabilities, and limitations of a digital timing system.

9. MAGNETRON TRANSMITTER (AN/GPN-20 or equivalent).

9.1. Describe the theory, capabilities, and limitations of a magnetron transmitter.

9.2. Verify magnetron transmitter operation.

9.3. Align magnetron transmitter circuits.

- 9.4. Isolate malfunction(s) to LRU.
- 9.5. Remove and replace LRU.
10. TRAVELING WAVE TUBE (TWT) TRANSMITTER (AN/GPN-22 or equivalent).
 - 10.1. Describe the theory, capabilities, and limitations of a TWT transmitter.
 - 10.2. Verify TWT transmitter operation.
 - 10.3. Align TWT transmitter circuits.
 - 10.4. Isolate malfunction(s) to LRU.
 - 10.5. Remove and replace LRU.
11. KLYSTRON TRANSMITTER (WSR-88D or equivalent).
 - 11.1. Describe the theory, capabilities, and limitations of a klystron transmitter.
12. TWYSTRON TRANSMITTER (AN/TPS-75 or equivalent).
 - 12.1. Describe the theory, capabilities, and limitations of a twystron transmitter.
 - 12.2. Verify twystron transmitter operation.
 - 12.3. Align twystron transmitter circuits.
 - 12.4. Isolate malfunction(s) to LRU.
 - 12.5. Remove and replace LRU.
13. NORMAL RECEIVER (AN/GPN-20 or equivalent).
 - 13.1. Describe the theory, capabilities, and limitations of a normal receiver.
 - 13.2. Verify normal receiver operation.
 - 13.3. Align a normal receiver.
 - 13.4. Isolate malfunction(s) to LRU.
 - 13.5. Remove and replace LRU.
14. MOVING TARGET INDICATOR (MTI) RECEIVER (AN/GPN-20 or equivalent).
 - 14.1. Describe the theory, capabilities, and limitations of a MTI receiver.
 - 14.2. Verify MTI receiver operation.
 - 14.3. Align an MTI receiver.
 - 14.4. Isolate malfunction(s) to LRU.
 - 14.5. Remove and replace LRU.

15. HEIGHT PROCESSING (AN/TPS-75 or equivalent).

15.1. Describe the theory, capabilities, and limitations of height processing.

15.2. Verify height processing system operation.

15.3. Align receiver.

15.4. Isolate malfunction(s) to LRU.

15.5. Remove and replace LRU.

16. VIDEO PROCESSOR (AN/GPN-20 or equivalent).

16.1. Describe the theory, capabilities, and limitations of a video processor.

16.2. Verify video processor operation.

16.3. Align video processor.

16.4. Isolate malfunction(s) to LRU.

16.5. Remove and replace LRU.

17. SLOTTED WAVEGUIDE ANTENNA SYSTEM (AN/TPS-75 or equivalent).

17.1. Describe the theory, capabilities, and limitations of a slotted waveguide antenna.

17.2. Verify antenna operation.

17.3. Align antenna.

18. FEEDHORN ANTENNA SYSTEM (AN/GPN-20 or equivalent).

18.1. Describe the theory, capabilities, and limitations of a feedhorn antenna system.

18.2. Perform voltage standing wave ratio (VSWR) performance check.

19. VIDEO DISPLAY INDICATOR.

19.1. OD-153 Indicator.

19.1.1. Describe the theory, capabilities, and limitations of the OD-153 Indicator.

19.1.2. Verify indicator operation.

19.1.3. Align indicator.

19.1.4. Isolate malfunction(s) to LRU.

19.1.5. Remove and replace LRU.

19.2. AN/UYQ-27 Indicator.

19.2.1. Describe the theory, capabilities, and limitations of the AN/UYQ-27 indicator.

19.2.2. Verify indicator operation.

19.2.3. Align indicator.

19.2.4. Isolate malfunction(s) to LRU.

19.2.5. Remove and replace LRU.

20. REMOTING AND CONTROL CIRCUITS.

20.1. AN/GPN-22 or equivalent.

20.1.1. Describe the theory, capabilities, and limitations of the remoting and control circuits.

20.1.2. Verify system operation.

20.1.3. Align remoting and control circuits.

20.1.4. Isolate malfunction(s) to LRU.

20.1.5. Remove and replace LRU.

20.2. Modular Control Equipment (MCE)/Interface Group (MIG) or equivalent.

20.2.1. Describe the theory, capabilities, and limitations of the remoting and control circuits.

20.2.2. Perform turn-on procedures.

20.2.3. Isolate malfunction(s) to LRU.

20.2.4. Remove and replace LRU.

21. TRANSMISSION MEDIA.

21.1. Explain the following transmission principles.

21.1.1. Lightwave.

21.1.2. Copper landline.

21.1.3. RF transmission.

21.2. Test and troubleshoot copper cable transmission lines.

21.3. Describe the theory, capabilities, and limitations of modulator/demodulator (MODEM) functions.

21.3.1. Verify modem operation.

21.3.2. Remove and replace modem.

21.4. Describe local area network and wide area network distribution systems.

22. PROGRAMMABLE INDICATOR DATA PROCESSOR (PIDP) II.

22.1. Describe the theory, capabilities, and limitations of the PIDP II.

22.2. Verify computer and peripheral operation.

22.3. Use diagnostic programs to isolate malfunction to LRU.

22.4. Load and run programs.

23. SECONDARY SURVEILLANCE RADAR SYSTEMS (AN/TPX-42 or equivalent).

23.1. Describe the operating characteristics of Modes 1, 2, 3, C, and unclassified Mode 4.

23.2. Describe the theory, capabilities, and limitations of the secondary surveillance radar system.

23.3. Verify system operation.

23.4. Align system.

23.5. Isolate malfunction(s) to LRU.

23.6. Remove and replace LRU.

24. RADAR TRACKING SYSTEMS (AN/GPN-22 or equivalent).

24.1. Describe the theory, capabilities, and limitations of:

24.1.1. Radar range tracking.

24.1.2. Radar angle tracking.

25. DIGITAL BRIGHT RADAR INDICATOR TOWER EQUIPMENT (DBRITE).

25.1. Describe the theory, capabilities, and limitations of the DBRITE system.

25.2. Verify system operation.

25.3. Align DBRITE tower display.

25.4. Isolate malfunction(s) to LRU.

25.5. Remove and replace LRU.

26. DIGITAL MAPPER (AN/GPA-134 or equivalent).

26.1. Describe the theory, capabilities, and limitations of the digital mapper.

27. MOBILE/TRANSPORTABLE SYSTEMS DEPLOYMENT PROCEDURES FOR GROUND RADAR SYSTEMS.

27.1. Describe pre-deployment procedures.

27.2. Describe capabilities and limitations of deployment by surface and air transport.

27.3. Describe capabilities and limitations for:

27.3.1. Positioning equipment.

27.3.2. Installing system grounds.

27.3.3. Erecting antenna.

27.3.4. Orienting antenna.

27.3.5. Interfacing radar with associated equipment.

27.3.6. Tearing down equipment.

28. RADAR SYSTEMS OPERATION.

28.1. Air Traffic Control (ATC) Systems.

28.1.1. Describe flight check requirements and safety of flight issues associated with the ATC system.

28.1.2. Equipment certification.

28.1.2.1. Describe the initial equipment certification process.

28.1.2.2. Describe recurring equipment certification process.

28.1.3. Describe the Air Traffic Control and Landing Systems (ATCALS) evaluation program.

28.2. Weather Radar Systems.

28.2.1. WSR-88D Next Generation Radar (NEXRAD).

28.2.1.1. Describe the theory, capabilities, and limitations of the NEXRAD.

28.2.1.2. Describe the role that Air Force NEXRAD Weather Radar Systems play in the overall National Weather Service mission.

28.2.2. AN/FMQ-18 Tactical Weather Radar (TWR).

28.2.2.1. Describe the theory, capabilities, and limitations of the TWR.

28.2.2.2. Describe the role that TWR plays in the Air Force weather mission.

28.3. AN/TPS-75 Surveillance Radar System.

28.3.1. Describe the theory, capabilities, and limitations of the AN/TPS-75.

28.3.2. Describe the role the AN/TPS-75 plays in supporting the Theater Air Control System (TACS) mission.

28.4. Deployable ATC Landing Control Central.

28.4.1. Describe the theory, capabilities, and limitations of the:

28.4.1.1. AN/TPN-19 Landing Control Central.

28.4.1.2. AN/MPN-14K Landing Control Central.

28.4.2. Describe the roles of the AN/TPN-19 and the AN/MPN-14K in the operational theater.

28.5. Selected Radar Systems Operation: (NOTE: When possible, training will be performed on the specific system that the student will see at their first assignment. Documentation indicating which tasks the student completed is provided to the graduate to hand carry to the gaining supervisor.) (See Note 3.)

28.5.1. Perform turn-on and turn-off procedures.

28.5.2. Verify radar system operation.

28.5.3. Perform preventive maintenance routines.

28.5.4. Align radar system.

28.5.5. Isolate minor system malfunction(s) (e.g. open door interlocks, tripped circuit breakers, low waveguide pressure).

28.5.6. Isolate malfunction(s) to LRU.

28.5.7. Remove and replace LRU.

29. MAINTENANCE DATA COLLECTION (MDC) SYSTEM.

29.1. Describe the purpose and importance of the MDC process.

29.2. Complete maintenance documentation using standard AF forms.

29.3. Input maintenance data using an automated data collection system.

30. EMERGING TECHNOLOGIES.

30.1. Identify principles and purpose of emerging technologies.

BEHAVIORAL FORMAT CTG CODING SYSTEM

Each CTG element is written as a behavioral statement. The detail of the statement and verb selection reflects the level of training provided.

Code	Definition
K	Subject Knowledge Training - The verb selection identifies the individual's ability to identify facts, state principles, analyze, or evaluate the subject.
-	When this code is used in the OJT Upgrade Column it indicates that the certification or qualification on this task is a local determination. When this code is used in the CDC Column it indicates that no training for this subject is provided in the CDCs.
X	When this code is used in the OJT Upgrade Column it indicates that the individual must be trained and certified on this task before they can be upgraded to the appropriate skill level. This code indicates that training to satisfy this requirement is either provided through OJT, CDCs, or a combination of OJT and CDCs.
X*	When this code is used in the OJT Upgrade Column it indicates that the individual must be trained and certified on this task before they can be upgraded to the appropriate skill level if the assigned duty position is responsible to maintain/operate the equipment or system indicated as assigned by the local work center supervisor. This code indicates that training to satisfy this requirement is normally provided through OJT.

CFETP versus AFJQS task coding. AFJQSs/AFQTPs annotated in the CFETP with an "X" denotes the AFJQS is mandatory. Within the AFJQS are individual tasks that are coded either "X" or "X*." If the tasks are coded "X," they are mandatory. If coded "X*," they are duty position specific.

The identification blocks listed below are to be used when the trainer is other than the trainee's immediate supervisor.

THIS BLOCK IS FOR IDENTIFICATION PURPOSES ONLY Personal Data - Privacy Act of 1974		
PRINTED NAME OF TRAINEE (<i>Last, First, Middle Initial</i>)	INITIALS (<i>Written</i>)	SSAN
PRINTED NAME OF TRAINER AND CERTIFYING OFFICIAL AND WRITTEN INITIALS		
N/I	N/I	
N/I	N/I	
N/I	N/I	
N/I	N/I	
N/I	N/I	
N/I	N/I	
N/I	N/I	

PREFACE

NOTE 1: Users are responsible for annotating technical references to identify current references pending CTG revision.

NOTE 2: AFJQS 2EXXX-200B, 2EXXX C-E Enlisted Specialty Training is mandatory for use in conjunction with this CTG. It sets the Air Force standard for qualification and certification for the following subject areas:

- Career Progression Information
- Information Security (INFOSEC)
- Communications Security (COMSEC)
- Protect MAJCOM/FOA Critical Mission Information
- Physical Security
- Electronic Emission Security (TEMPEST)
- Electronic Warfare
- Operational Risk Management
- Training
- Work Center Administration
- Operator Care of Assigned Government Vehicles
- Supply
- Technical Orders (TO) and Technical Publications
- Supervision
- C-E Equipment Maintenance Management
- C-E Equipment Maintenance System Inspecting, Reporting, and Forms

NOTE 3: Equipment/system knowledge and/or performance tasks are defined in the AFJQS. AFJQS items set the standard for qualification and certification and are mandatory for use in conjunction with this CTG. AFQTPs listed in the CTG are generally handbooks which do not have task listings, therefore tracking through the Core Automated Maintenance System (CAMS) is not possible. Annotate completion of these products on AF Form 623A.

NOTE 4: When an AFJQS is loaded into CAMS, letters in the AFJQS identifier are converted to the number representing each letter's alphabetical position (e.g., 200B would be loaded as 200.2). To save space, individual AFJQS tasks are not normally listed within the CTG. However, if a CTG task is closely related to an AFJQS task or area, the AFJQS task/heading is listed (e.g., 200.2.12) and the related CTG task is listed under it (e.g., 200.2.12.75). To prevent potential task numbering conflicts between AFJQS tasks and subordinate CTG tasks, subordinate CTG tasks start with the number 75. This creates gaps in the final task numbering sequence, but integrates related CTG and AFJQS tasks so they will be listed on your training documents in the same area and in order.

NOTE: 5 When loading AFJQS tasks into the CAMS database, tasks are loaded as STS not 797 items.

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	5-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
1. ELECTRONIC PRINCIPLES (EP). TR: EP CBT; TO 31-1-141							
1.1. Identify principles and capabilities of electronic devices and circuits	-	K					
2. TEST EQUIPMENT. TR: TO 33K-1-100, Applicable test equipment technical orders							
2.1. Identify principles, capabilities, and limitations of the following test equipment items:							
2.1.1. Analog oscilloscope.	-	K					
2.1.2. Digital oscilloscope.	-	K					
2.1.3. Spectrum analyzer.	-	K					
2.1.4. Analog multimeter.	-	K					
2.1.5. Digital multimeter.	-	K					
2.1.6. Power meter.	-	K					
2.1.7. Optical time domain reflectometer.	-	K					
2.1.8. Time domain reflectometer.	-	K					
2.1.9. Bit error rate test set.	-	K					
2.1.10. RF signal generator.	-	K					
2.1.11. Frequency counter.	-	K					
2.1.12. Radar test sets (AN/UPM-145).	-	K					
2.1.13. IFF/SIF radar test sets (AN/UPM-155).	-	K					
2.2. Perform equipment maintenance using the following test equipment/devices:							
2.2.1. Analog multimeter.	X*	-					
2.2.2. Digital multimeter	X*	-					
2.2.3. Signal generator.	X*	-					
2.2.4. Oscilloscope	X*	-					
2.2.5. Power meter.	X*	-					
2.2.6. Spectrum analyzer.	X*	-					
2.2.7. Pulse generator.	X*	-					
2.2.8. Crystal detectors.	X*	-					
2.2.9. High voltage probes	-	-					
2.2.10. Attenuators	X*	-					

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	5-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
2.2.11. Frequency counters.	X*	-					
2.2.12. Sweep generators.	-	-					
2.2.13. Radar test sets (AN/UPM-145).	X*	-					
2.2.14. Wavemeters.	X*	-					
2.2.15. IFF/SIF radar test sets (AN/UPM-155).	X*	-					
2.2.16. Vector voltmeter.	-	-					
2.2.17. Megohmmeters.	X*	-					
2.2.18. Logic probes.	-	-					
2.2.19. Echo boxes.	-	-					
2.2.20. Noise figure meters.	X*	-					
2.2.21. Capacitor analyzers.	-	-					
2.2.22. High voltage insulation test sets.	-	-					
2.2.23. Flux meter.	-	-					
2.2.24. Logic pulsers.	-	-					
2.2.25. Oil testers.	X*	-					
2.2.26. Differential voltmeters.	-	-					
2.2.27. Dummy loads.	X*	-					
2.2.28. Flow meters.	-	-					
3. STANDARD MAINTENANCE PRACTICES.							
3.1. Describe basic troubleshooting procedures.	X*	-					
3.2. Interpret results of diagnostic programs.	X*	-					
3.3. Interpret diagrams for fault isolation.	X*	-					
3.4. Locate elements such as unit, module, row, column, component, pin, connector, or test point using alphanumeric designator.	X*	-					
3.5. Solder and desolder electronic equipment components.	X*	-					
4. COMPUTER SECURITY (COMPUSEC). TR: AFI 33-202 and AFQTP 2EXXX-202D							
4.1. Define COMPUSEC.	X	-					
4.2. Identify vulnerabilities and incidents.	X	-					
4.3. Describe data protection techniques.	X	-					
4.4. Describe basic countermeasures.	X	-					
4.5. Describe reporting procedures.	X	-					

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	5-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
4.6. Explain malicious logic.	X	-					
4.7. Describe methods of malicious logic protection.	X	-					
4.8. Describe TEMPEST suppression techniques.	X*	-					
4.9. Perform TEMPEST maintenance.	X*	-					
5. STANDARD INSTALLATION PRACTICES. TR: TOs 31-10-7, 31-10-11, 31-10-13, 31-10-24, 31W-3-6, 31W-1-102, 31W2-4-330 series, and 31W3-10-20; TIA/EIA 568A & 569; AFI 32-1065; AFJQS 2EXXX-202B							
5.1. State facts related to the following practices:							
5.1.1. Installation.	X	K					
5.1.2. Configuration.	X	K					
5.1.3. Interconnection.	X	K					
5.1.4. Inspection.	X	K					
5.2. Explain the importance of cable labeling and installation documentation.	X	K					
5.3. Describe wire color coding standards.	X*	K					
5.4. Describe fiber optics installation concepts.	X*	K					
5.5. Describe the concepts of:							
5.5.1. Grounding.	X	K					
5.5.2. Bonding.	X	K					
5.5.3. Shielding.	X	K					
5.5.4. Lightning protection.	X	K					
5.6. Remove or install equipment grounds.	X*	-					
5.7. Check quality of equipment grounds.	X*	-					
5.8. Identify procedures to terminate multi-conductor cables.	X*	-					
5.9. Construct the following cable connectors:							
5.9.1. Multi pin.	X*	-					
5.9.2. Modular.	X*	-					
5.9.3. Coaxial.	X*	-					
5.9.4. Fiber.	X*	-					
5.10. Isolate and repair malfunctions in cable assemblies.	X*	-					

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	5-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
6. COMMUNICATIONS PRINCIPLES. TR: TO 31-1-141 Series							
6.1. State facts relating to the following:							
6.1.1. Amplitude modulation (AM).	-	K					
6.1.2. Frequency modulation (FM).	-	K					
6.1.3. Phase modulation (PM).	-	K					
6.1.4. Pulse code modulation (PCM).	-	K					
6.1.5. Bandwidth.	-	K					
6.1.6. Lightwave communications.	-	K					
6.1.7. Asynchronous/synchronous communication modes.	-	K					
6.1.8. Error detection and correction.	-	K					
6.2. State facts relating to the theory of operation of the following interface standards and protocols:							
6.2.1. EIA/RS-232C.	-	K					
6.2.2. EIA/RS-449.	-	K					
6.2.3. EIA/RS-422.	-	K					
6.2.4. EIA/RS-423.	-	K					
6.2.5. EIA-530.	-	K					
6.2.6. EIA-568.	-	K					
6.2.7. V.35.	-	K					
6.2.8. MIL STD 188-114A.	-	K					
6.2.9. TCP/IP. TR: CBT Volume—Microsoft TCP/IP on Windows NT 4.0: Introduction to TCP/IP and IP Addressing http://afcbt.den.disa.mil	-	-					
6.2.10. X.25/1822.	-	-					
6.2.11. GOSIP.	-	-					
6.3. State facts relating to the theory of operation of communication protocols/addressing. TR: CBT Volume—Internetworking Essentials: Introduction to Common Networking Protocols and Internetworking Overview http://afcbt.den.disa.mil	-	-					
6.4. State facts relating to the following switching methods: TR: CBT Volume—WAN Technologies http://afcbt.den.disa.mil							

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	5-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
6.4.1. Circuit.	-	-					
6.4.2. Message.	-	-					
6.4.3. Packet.	-	-					
6.4.4. Asynchronous transfer mode (ATM). TR: CBT Volume—WAN Technologies: ATM Principles http://afcbt.den.disa.mil	-	-					
6.5. State facts relating to multiplexing methods. TR: CBT Volume—Internetworking Essentials: 1) Data Communications: Signals and Systems 2) WAN Technologies http://afcbt.den.disa.mil							
6.5.1. Frequency Division Multiplexing (FDM).	-	-					
6.5.2. Time Division Multiplexing (TDM).	-	-					
6.5.3. T1 rate and higher.	-	-					
6.6. State facts relating to the following cryptology methods:							
6.6.1. Secret key/symmetrical (traditional cryptographic equipment).	-	-					
6.6.2. Public key/asymmetrical (FORTEZZA).	-	-					
7. INFORMATION TRANSPORT CONCEPTS.							
7.1. State facts relating to the theory of operation of the following network configurations: TR: CBT Volume—Novell Networking Technologies: Concepts and Services; CBT Volume--Internetworking Essentials: LAN Fundamentals; and CBT Volume--LAN Technologies: LAN Topologies and Techniques at http://afcbt.den.disa.mil							
7.1.1. Network topologies (Star, Ring, Bus, etc.).	X	-					
7.1.2. Network types (LAN, WAN, VPN).	X	-					
7.2. State facts relating to the theory of operation of the following information transport devices: TR: CBT Volume—Internetworking Essentials: Fundamentals of Internetworking; CBT Volume--LAN Technologies: LAN Media and Components http://afcbt.den.disa.mil							
7.2.1. Routers.	X	-					
7.2.2. Hubs (concentrators).	X	-					
7.2.3. Bridges.	X	-					
7.2.4. Gateways.	X	-					
7.2.5. Switches.	X	-					

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	5-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
7.2.6. Data terminal equipment (DTE).	X	-					
7.2.7. Data communications equipment (DCE).							
7.2.7.1. Modems.	X	-					
7.2.7.2. Data service units/channel service units (DSU/CSU).	X	-					
7.2.8. Multiplexers.	X	-					
7.2.9. Network interface card.	X	-					
7.2.10. Common encryption devices used in AF and DOD communication networks.	-	-					
7.2.11. Integrated Digital Network Exchange (IDNX).	-	-					
8. EXPEDITIONARY COMMUNICATIONS CONCEPTS. TR: https://aefcenter.acc.af.mil							
8.1. Identify basic concepts of the Aerospace Expeditionary Force (AEF) deployment process. TR: AFI 10-400, Chap 1 thru 3	X	K					
8.2. Explain basic concepts of Unit Type Codes (UTC) and Force Packaging as it relates to the AEF tasking process. TR: AFMAN 10-401, Chap 4 thru 6; http://www.fas.org/man/dod-101/usaf/docs/cwpc/4200-FO.htm	X	K					
8.3. Describe deployment procedures. TR: AFMAN 10-100; MAJCOM and Local Directives							
8.3.1. Pre-deployment.	X	K					
8.3.2. Employment.	X	K					
8.3.3. Post deployment.	X	K					
8.3.4. Recovery.	X	K					
8.4. Identify deployable communications systems associated with this AFSC.	X	K					
8.5. Accomplish the following mobility procedures: TR: Applicable MAJCOM directives; TOs 00-20-series							
8.5.1. Pre-deployment inspections.	X*	-					
8.5.2. Air mobility equipment preparation.	X*	-					
8.5.3. Road mobility equipment preparation.	X*	-					
8.5.4. Post-deployment turn around.	X*	-					
9. ELECTRICAL POWER SYSTEMS.							

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	5-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
9.1. Describe the application of the following types of uninterruptible power supplies:							
9.1.1. Batteries. TR: AFJQS 3E0X2-214D, Module 1	X*	-					
9.1.2. Switched electrical power systems. TR: AFQTP 3E0X2-213YA, Modules 1 and 2	X*	-					
9.2. Describe the application of the following types of generators:							
9.2.1. Fixed.	X*	-					
9.2.2. Mobile/tactical.	X*	-					
9.2.3. 60 Hertz.	X*	-					
9.2.4. 400 Hertz.	X*	-					
9.3. Describe commercial power requirements.	X*	-					
9.4. Describe power phasing requirements.	X*	-					
10. AN/TPN-19, LANDING CONTROL CENTRAL. TR: TO 31P5-2TPN24-2 and 31P5-2TPN25-2							
10.1. Describe AN/TPN-19 system operation.							
10.1.1. Airport Surveillance Radar (ASR).	-	K					
10.1.2. Precision Approach Radar (PAR).	-	K					
10.1.3. OK-235/236 Operational Shelters.	-	K					
10.2. Accomplish Antenna Orientation on:							
10.2.1. ASR.	-	-					
10.2.2. PAR.	-	-					
11. AN/MPN-14K, LANDING CONTROL CENTRAL. TR: TO 31P5-2MPN14-22							
11.1. ASR.							
11.1.1. Describe the timing system functional circuit operation.	X*	-					
11.1.2. Describe the transmitter functional system operation.	X*	-					
11.1.3. Describe the antenna and RF transmission devices functional system operation.	X*	-					
11.1.4. Describe the receiver functional circuit operation.	X*	-					
11.1.5. Describe the video processing functional circuit operation.	X*	-					

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	5-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
11.1.6. Describe the remoting and control functional circuit operation.	X*	-					
11.2. PAR.							
11.2.1. Describe the timing system functional circuit operation.	X*	-					
11.2.2. Describe the transmitter functional system operation.	X*	-					
11.2.3. Describe the antenna and RF transmission devices functional system operation.	X*	-					
11.2.4. Describe the receiver functional circuit operation.	X*	-					
11.2.5. Describe the video processing functional circuit operation.	X*	-					
11.2.6. Describe the remoting and control functional circuit operation.	X*	-					
11.3. Accomplish Antenna Orientation on:							
11.3.1. ASR.	X*	-					
11.3.2. PAR.	X*	-					
12. ELECTRONIC COMBAT. TR: AFI 10-706 and AFT 51-45							
12.1. Describe electronic combat phenomenon as it applies to/impacts radar systems.	X*	K					
12.2. Recognize electronic attack (EA).	X	K					
12.3. Describe electronic warfare support (ES).	X	K					
12.4. Employ proper electronic protection (EP).	X	K					
200. AIR FORCE JOB QUALIFICATION STANDARDS APPLICABLE TO AFSC 2E051. TR: AFI 21-116, 36-2233, CFETP 2E0X1 (See Notes 3 and 4)							
200.2. AFJQS 2EXXX-200B, 2EXXX C-E Enlisted Specialty Training. (See Note 2)	X						
200.4. AFJQS XXXXX-200D, Aerospace Expeditionary Force (AEF) Qualification Training.	X*						
201.3. AFJQS 2EXXX-201C, Corrosion Prevention and Control.	X						
201.5. AFJQS 2EXXX-201E, Communications-Electronics (C-E) Core Automated Maintenance System (CAMS).	X*						
201.7. AFJQS 2EXXX-201G, Maintenance Support.	X*						

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	5-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
201.8. AFJQS 2EXXX-201H, Work Center Deficiency/Discrepancy Reporting.	X*						
201.10. AFJQS 2EXXX-201J, Maintenance Training Program.	X*						
201.16. AFJQS 2EXXX-201P, Work Center Test Equipment Management.	X*						
202.1. AFQTP 2EXXX-202A, Electrostatic Discharge Familiarization Handbook.	X*						
202.2. AFJQS 2EXXX-202B, SIPT Electronics and Inside Plant (E&I).	X*						
202.4. AFQTP 2EXXX-202D, EI Tempest Installation Handbook.	X*						
202.24. WSR-88 NEXT GENERATION RADAR (NEXRAD).							
202.24.1. AFJQS 2E0X1-202XA, WSR-88D Next Generation Radar Principal User Processor (NEXRAD PUP).	X*						
202.24.2. AFJQS 2E0X1-202XB, WSR-88D NEXRAD Radar Product Generation.	X*						
202.24.3. AFJQS 2E0X1-202XC, WSR-88D NEXRAD Narrowband Communications.	X*						
202.24.4. AFJQS 2E0X1-202XD, WSR-88D Next Generation Radar Data Acquisition Unit (NEXRAD RDA).	X*						
202.24.75. Describe NEXRAD system operation.	-	K					
203. AIR TRAFFIC CONTROL SYSTEMS.							
203.1. AFJQS 2E0X1-203A, AN/GPA-134, Digital Mapper.							
203.1.75. Describe AN/GPA-134 system operation.	-	-					
203.12.1. AFJQS 2E0X1-203LA, AN/GPN-22 System Level Maintenance.	X*						
203.12.1.75. Describe AN/GPN-22 system operation.	-	K					
203.12.2. AFJQS 2E0X1-203LB, AN/TPX-42 Interrogator.	X*						
203.12.2.75. Describe AN/TPX-42 system operation.	-	K					
203.14. AN/GPN-20, Airport Surveillance Radar (ASR) System.							
203.14.1. AFQTP 2E0X1-203NA, AN/GPN-20 System Level Maintenance Handbook.	X*						

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	5-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
203.14.2. AFJQS 2E0X1-203NB, AN/GPN-20 Transmitter System.	X*						
203.14.3. AFJQS 2E0X1-203NC, AN/GPN-20 Receiver System.	X*						
203.14.4. AFJQS 2E0X1-203ND, AN/GPN-20 Processor System.	X*						
203.14.5. AFJQS 2E0X1-203NE, AN/GPN-20 Antenna and Auxiliary Equipment.	X*						
203.14.6. AFJQS 2E0X1-203NF, OD-56/57 Indicators.	X*						
203.14.75. Describe AN/GPN-20 system operation.	-	K					
203.19. AFJQS 2E0X1-203S, Digital Bright Radar Tower Equipment (DBRITE).	X*						
203.19.75. Describe DBRITE system operation.	-	K					
207. AUTOTRACK THREAT EMITTER SYSTEMS.							
207.1. AFJQS 2E0X1-207A, AN/MST-T1A MUTES. NOTE: Assigned personnel must be qualified on one transmitter type for 5-level upgrade.	X*						
207.1.75. Describe AN/MST-T1A system operation.	-	-					
207.2. AFJQS 2E0X1-207B, AN/MST-T1V Mini MUTES. NOTE: Assigned personnel must be qualified on one transmitter type for 5-level upgrade.	X*						
207.2.75. Describe AN/MST-T1V system operation	-	-					
207.4. AFJQS 2E0X1-207D, AN/VPQ-1 Tactical Radar Threat Generator.	X*						
207.5. AFJQS 2E0X1-207E, AN/MPQ-T3 Bomb Scoring Set.	X*						
207.9. AFJQS 2E0X1-207I, AN/MSQ-T43 (V)1 and (V)4 Modular Threat Emitter (MTE).	X*						
207.11. AFJQS 2E0X1-207K, AN/MSR-T4 TRAINS.	X*						
207.12. AFJQS 2E0X1-207L, AN/TPQ-43 Seek Score.	X*						
211. AIRCRAFT CONTROL AND WARNING SYSTEMS.							
211.16. AN/TPS-75 Surveillance Radar Maintenance.							
211.16.1. AFJQS 2E0X1-211PA, AN/TPS-75 Mobile Radar Preventive Maintenance Inspections.	X*						
211.16.2. AFJQS 2E0X1-211PB, AN/TPS-75 Mobile Radar Alignments.	X*						

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	5-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
211.16.3. AFJQS 2E0X1-211PC, AN/TPS-75 Mobile Radar Deployment.	X*						
211.16.4. AFJQS 2E0X1-211PD, AN/UYQ-27 Situation Display Console.	X*						
211.16.4.75. Describe AN/UYQ-27 system operation.	-	K					
211.16.4.76. Isolate malfunction to LRU.	-	-					
211.16.4.77. Remove and replace LRU.	-	-					
211.16.6. AFJQS 2E0X1-211PF, AN/UPX-27 Interrogator Set.	X*						
211.16.6.75. Describe AN/UPX-27 system operation.	-	K					
211.16.6.76. Isolate malfunction to LRU.	-	-					
211.16.6.77. Remove and replace LRU.	-	-					
211.16.7. AFJQS 2E0X1-211PG, AN/UPA-59 Decoder Group.	X*						
211.16.7.75. Describe AN/UPA-59 system operation.	-	K					
211.16.7.76. Isolate malfunction to LRU.	-	-					
211.16.7.77. Remove and replace LRU.	-	-					
211.16.75. Describe AN/TPS-75 system operation.	-	K					
211.16.76. Isolate malfunction in AN/TPS-75.	-	-					
211.16.77. Power supplies.							
211.16.77.1. Isolate malfunction to LRU.	-	-					
211.16.77.2. Remove and replace LRU.	-	-					
211.16.78. Transmitter.							
211.16.78.1. Isolate malfunction to LRU.	-	-					
211.16.78.2. Remove and replace LRU.	-	-					
211.16.79. Antenna and RF transmission devices.							
211.16.79.1. Isolate malfunction to LRU.	-	-					
211.16.79.2. Remove and replace LRU.	-	-					
211.16.80. Receivers.							
211.16.80.1. Isolate malfunction to LRU.	-	-					
211.16.80.2. Remove and replace LRU.	-	-					
211.16.81. Digital signal processors.							
211.16.81.1. Isolate malfunction to LRU.	-	-					
211.16.81.2. Remove and replace LRU.	-	-					

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	5-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
211.16.82. Monitor fault isolation (MFI).							
211.16.82.1. Accomplish MFI performance checks.	X*	-					
211.16.82.2. Isolate malfunction to LRU.	-	-					
211.16.82.3. Remove and replace LRU.	-	-					
211.16.83. Modular control equipment interface group.							
211.16.83.1. Accomplish performance checks.	X*	-					
211.16.83.2. Isolate malfunction to LRU.	-	-					
211.16.83.3. Remove and replace LRU.	-	-					
211.16.84. IFF/SIF System.							
211.16.84.1. Describe IFF/SIF system operation.	X*	K					
211.16.84.2. ISLS control assembly.							
211.16.84.2.1. Isolate malfunction to LRU.	-	-					
211.16.84.2.2. Remove and replace LRU.	-	-					
211.16.85. AN/TLQ-32, Decoy set.							
211.16.85.1. Describe AN/TLQ-32 system operation.	-	K					
211.16.85.2. Set up.	X*	-					
211.16.85.3. Isolate malfunction to LRU.	-	-					
211.16.85.4. Remove and replace LRU.	-	-					
211.17. AFQTP 2E0X1-211Q, AN/TPN-19 Landing Control Central.	X*						
211.17.1. AFJQS 2E0X1-211QA, OK-235/236 Operational Shelters.	X*						
211.17.2. AFJQS 2E0X1-211QB, AN/TPN-24 Airport Surveillance Radar.	X*						
213.21. AFJQS XXXXX-213U, Tactical Generator Operation for Non Power Production Personnel.	X*						

BEHAVIORAL FORMAT CTG CODING SYSTEM

Each CTG element is written as a behavioral statement. The detail of the statement and verb selection reflects the level of training provided.

Code	Definition
K	Subject Knowledge Training - The verb selection identifies the individual's ability to identify facts, state principles, analyze, or evaluate the subject.
-	When this code is used in the OJT Upgrade Column it indicates that the certification or qualification on this task is a local determination. When this code is used in the CDC Column it indicates that no training for this subject is provided in the CDCs.
X	When this code is used in the OJT Upgrade Column it indicates that the individual must be trained and certified on this task before they can be upgraded to the appropriate skill level. This code indicates that training to satisfy this requirement is either provided through OJT, CDCs, or a combination of OJT and CDCs.
X*	When this code is used in the OJT Upgrade Column it indicates that the individual must be trained and certified on this task before they can be upgraded to the appropriate skill level if the assigned duty position is responsible to maintain/operate the equipment or system indicated as assigned by the local work center supervisor. This code indicates that training to satisfy this requirement is normally provided through OJT

CFETP versus AFJQS task coding. AFJQSs/AFQTPs annotated in the CFETP with an "X" denotes the AFJQS is mandatory. Within the AFJQS are individual tasks that are coded either "X" or "X* ". If the tasks are coded "X," they are mandatory. If coded "X*," they are duty position specific.

The identification blocks listed below are to be used when the trainer is other than the trainee's immediate supervisor.

THIS BLOCK IS FOR IDENTIFICATION PURPOSES ONLY Personal Data - Privacy Act of 1974		
PRINTED NAME OF TRAINEE (<i>Last, First, Middle Initial</i>)	INITIALS (<i>Written</i>)	SSAN
PRINTED NAME OF TRAINER AND CERTIFYING OFFICIAL AND WRITTEN INITIALS		
N/I	N/I	
N/I	N/I	
N/I	N/I	
N/I	N/I	
N/I	N/I	
N/I	N/I	
N/I	N/I	

PREFACE

NOTE 1: Users are responsible for annotating technical references to identify current references pending CTG revision.

NOTE 2: Completion of AFQTP 2EXXX-201L, Work Center Manager's handbook and AFQTP 2E0X1-207C, Advanced Radar Principles are mandatory for upgrade to the 7-level.

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	7-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
70. DEPLOYMENT CONCEPTS.							
70.1. Deployment Plans. TR: AFI 10-201							
70.1.1. Describe the purpose of the following:							
70.1.1.1. OPLAN communications requirements.	X	-					
70.1.1.2. Time Phased Force Deployment Document (TPFDD).	X	-					
70.1.1.3. Unit readiness reporting procedures.	X	-					
70.1.1.4. Report UTC status to command authorities.	X	-					
70.2. Unit Type Code (UTC) Development and Reporting. TR: AFMAN 10-401							
70.2.1. Identify UTC development process.	X	-					
70.2.2. Identify UTC adjustment procedures.	X	-					
70.3. Deployment Procedures. TR: AFIs 10-403, 33-211; and 21-109; AFMAN 23-110							
70.3.1. Develop load plan.	X*	-					
70.3.2. Explain pallet build-up procedures.	X*	-					
70.3.3. Explain hazardous cargo preparation.	X*	-					
70.3.4. Prepare documentation.	X*	-					
70.3.5. Determine site selection requirements.	X*	-					
70.3.6. Determine site preparation requirements.	X*	-					
70.3.7. Determine site configuration requirements.	X*	-					
70.3.8. Determine requirements for constructing deployment site utility grids.	X*	-					
70.3.9. Describe control of COMSEC material.	X*	-					
71. SYSTEM PLANNING AND IMPLEMENTATION. TR: AFI 33-104 and AFI 21-404; TO 32-series; AFQTP 2EXXX-202B							
71.1. Identify systems support requirements for new or modified systems.	X	-					
71.2. Describe how to manage planning and implementation of new systems.	X	-					
72. State facts relating to the following work center management principles. (See Note 2) TR: AFQTP 2EXXX-201L							

TASKS, KNOWLEDGE AND TECHNICAL REFERENCES	7-LEVEL		OJT CERTIFICATION				
	OJT Upgrade	CDC	Start Date	Stop Date	Trainee Initials	Trainer Initials	Certifier Initials
72.1. Principles of management.	X	-					
72.2. Training.	X	-					
72.3. Supply.	X	-					
72.4. Core Automated Maintenance System (CAMS).	X	-					
72.5. Work center management.	X	-					
72.6. Safety and security.	X	-					
72.7. Maintenance standards.	X	-					
72.8. Performance reports.	X	-					
72.9. Awards and recognition.	X	-					
72.10. Mobility/deployment.	X	-					
72.11. Manpower.	X	-					
72.12. Financial management.	X	-					
73. State facts relating to the following advanced radar principles. (See Note 2) TR: AFQTP 2E0X1-207C							
73.1. Antenna types.	X	-					
73.2. Radiation patterns and properties.	X	-					
73.3. Propagation anomalies.	X	-					

Section B - Course Objective List

4. This section not used.

Section C - Support Materials

5. The following is a list of available support materials.

5.1. **Computer Based Training Products.** Air Force computer based training products can be found at <http://afcbt.den.disa.mil>.

5.2. Air Force Job Qualification Standards and Air Force Qualification Training Packages

5.2.1. Refer to AFIND8, Numerical Index of Specialty Education/Training Publications, for the list of published AFJQSs/AFQTPs or download these products from <https://wwwmil.keesler.af.mil/81trss/qflight/welcome.html>. Refer to AFI 36-2233, *Air Force On-the-Job Training Products for Communications-Electronics Enlisted Specialty Training*, for information on how to request development of AFJQSs/AFQTPs.

5.2.2. AFJQSs/AFQTPs applicable to AFSC 2E0X1:

Publication No.	Pseudo Code	Publication Title
AFJQS 2E0X1-202XA	2E0X1-202.24.1	WSR-88D Next Generation Radar Principal User Processor (NEXRAD PUP)
AFJQS 2E0X1-202XB	2E0X1-202.24.2	NEXRAD Radar Product Generation
AFJQS 2E0X1-202XC	2E0X1-202.24.3	NEXRAD Narrowband Communications
AFJQS 2E0X1-202XD	2E0X1-202.24.4	WSR-88D Next Generation Radar Data Acquisition Unit (NEXRAD RDA)
AFJQS 2E0X1-203A	2E0X1-203.1	AN/GPA-134 Digital Mapper
AFJQS 2E0X1-203LA	2E0X1-203.12.1	AN/GPN-22 System Level Maintenance
AFJQS 2E0X1-203LB	2E0X1-203.12.2	AN/TPX-42 Interrogator
AFQTP 2E0X1-203NA	N/A	AN/GPN-20 System Level Maintenance Handbook
AFJQS 2E0X1-203NB	2E0X1-203.14.2	AN/ GPN-20 Transmitter System
AFJQS 2E0X1-203NC	2E0X1-203.14.3	AN/ GPN-20 Receiver System
AFJQS 2E0X1-203ND	2E0X1-203.14.4	AN/ GPN-20 Processor System
AFJQS 2E0X1-203NE	2E0X1-203.14.5	AN/ GPN-20 Antenna and Auxiliary Equipment.
AFJQS 2E0X1-203NF	2E0X1-203.14.6	AN/ GPN-20 Indicators
AFJQS 2E0X1-203S	2E0X1-203.19	Digital Bright Radar Tower Equipment (DBRITE)
AFJQS 2E0X1-207A	2E0X1-207.1	AN/MST-T1A MUTES
AFJQS 2E0X1-207B	2E0X1-207.2	AN/MST-T1V MINI MUTES
AFJQS 2E0X1-207C	2E0X1-207.3	Advanced Radar Principles
AFJQS 2E0X1-207D	2E0X1-207.4	AN/VPQ-1 TRTG
AFJQS 2E0X1-207E	2E0X1-207.5	AN/MPQ-T3 Bomb Scoring Set
AFJQS 2E0X1-207I	2E0X1-207.9	AN/MSQ-T43 (V)1 and (V)4 Modular Threat Emitter (MTE)
AFJQS 2E0X1-207K	2E0X1-207.11	AN/MSR-T4 TRAINS
AFJQS 2E0X1-207L	2E0X1-207.12	AN/TPQ-43 SEEK SCORE
AFJQS 2E0X1-211PA	2E0X1-211.16.1	AN/TPS-75 Mobile Radar Preventive Maintenance Inspections
AFJQS 2E0X1-211PB	2E0X1-211.16.2	AN/TPS-75 Mobile Radar Alignments
AFJQS 2E0X1-211PC	2E0X1-211.16.3	AN/TPS-75 Mobile Radar Deployment
AFJQS 2E0X1-211PD	2E0X1-211.16.4	AN/UPX-27 Situation Display Console
AFJQS 2E0X1-211PF	2E0X1-211.16.6	AN/UPX-27 Interrogator Set
AFJQS 2E0X1-211PG	2E0X1-211.16.7	AN/UPA-59 Decoder Group
AFQTP 2E0X1-211Q	N/A	AN/TPN-19 Landing Control Central
AFJQS 2E0X1-211QA	2E0X1-211.17.1	OK-235/236 Operational Shelters
AFJQS 2E0X1-211QB	2E0X1-211.17.2	AN/TPN-24 Airport Surveillance Radar

5.2.3. Additional AFJQS/AFQTP maintenance management and generic training products applicable to this specialty.

<u>Publication No.</u>	<u>Pseudo Code</u>	<u>Publication Title</u>
AFJQS 2EXXX-200B	2EXXX-200.2	2EXXX C-E Enlisted Specialty Training
AFJQS XXXXX-200D	XXXXX-200.4	Aerospace Expeditionary Force (AEF) Qualification Training
AFJQS 2EXXX-201C	2EXXX-201.3	Corrosion Prevention and Control
AFJQS 2EXXX-201E	2EXXX-201.5	Communications-Electronics (C-E) Core Automated Maintenance System
AFJQS 2EXXX-201G	2EXXX-201.7	Maintenance Support
AFJQS 2EXXX-201H	2EXXX-201.8	Work Center Deficiency/Discrepancy Reporting
AFJQS 2EXXX-201J	2EXXX-201.10	Maintenance Training Program
AFQTP 2EXXX-201L	2EXXX-201.12	Communications-Electronics (C-E) Work Center Manager's Handbook
AFQTP 2EXXX-201LB	2EXXX-201.12.2	Communications-Electronic (C-E) Manager's Handbook
AFJQS 2EXXX-201P	2EXXX-201.16	Work Center Test Equipment Management
AFQTP 2EXXX-202A	2EXXX-202.1	Electrostatic Discharge Familiarization Handbook
AFJQS 2EXXX-202B	2EXXX-202.2	SIPT Electronics and Inside Plant (E&I)
AFQTP 2EXXX-202D	2EXXX-202.4	EI Tempest Installation Handbook
AFJQS XXXXX-213U	XXXXX-213.21	Tactical Generator Operation For Non Power Production Personnel
AFQTP 3E0X2-213YA	N/A	Solid State Uninterruptible Power System Principles
AFJQS 3E0X2-214D	3E0X2-214.4	Stationary Battery Banks

Section D - Training Course Index

6. The following is a list of the available Air Force in-residence, field, and/or exportable training courses.

6.1. **Air Force In-Residence Courses.** For information on all formal courses, refer to the Air Force Education and Training Course Announcements (ETCA) database, formerly AFCAT 36-2223, USAF Formal Schools Catalog at <https://hq2af.keesler.af.mil/etca.htm>.

<u>Course Number</u>	<u>Course Title</u>	<u>Location</u>
E3ABR2E031 002	Ground Radar Systems Apprentice	Keesler
E3AZR2E051 030*	AN/TPS-75 Radar O/I Maintenance	Keesler
E3AZR2E051 031	AN/TPS-75 Ancillary Systems	Keesler
E3AZR2E051 013	Principle User Processor (PUP) O/I Maintenance	Keesler
E3AZR2E051 014	WSR-88D Weather Radar O/I Maintenance	Keesler
E3AZR2E051 026	Digital Airport Surveillance Radar (DASR) Maintenance (Course in development)	Keesler
E3AZR2E051 027	Standard Terminal Automation Replacement System (STARS) Maintenance (Course in development)	Keesler

*E3AZR2E031 030 is piggybacked onto 3-level course and is designed for individuals who have no prior TPS-75 training. Individuals graduating from the 3-level since Oct 99 need not attend this course prior to attendance in E3AZR2E051 031.

6.2. **Air Force Engineering and Technical Services (AFETS) Training.** For a listing of AFETS courses, refer to the *Catalog of Communications-Electronics Air Force Engineering and Technical Services Courses*. This catalog is revised annually and is available through your MAJCOM's C-E MATAG Working Group representative or can be downloaded from https://www.afca.scott.af.mil/c-e_maint/afets.htm.

Section E - MAJCOM Unique Requirements

7. There are currently no MAJCOM unique requirements. This area is reserved.